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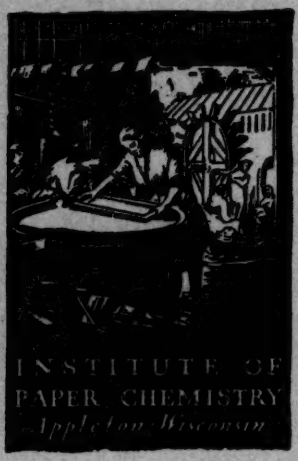
# BULLETIN

## OF

## THE INSTITUTE OF PAPER CHEMISTRY




AFFILIATED WITH

LAWRENCE COLLEGE

APPLETON, WISCONSIN

# LIBRARY NOTES

OCTOBER · 1949

Volume 20 Number 2

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# Books and Pamphlets Added to the Library During September

## BIOLOGICAL CHEMISTRY

GORTNER, Ross AIKEN. Outlines of biochemistry. 3d ed., ed. by Ross Aiken Gortner, Jr., and Willis Alway Gortner. New York, Wiley [c1949] 1078 p.

## CARBOHYDRATES

ADVANCES in carbohydrate chemistry. Ed. by W. W. Pigman [and] M. L. Wolfrom. Associate editor for the British Isles, Stanley Peat. New York, Academic Press, 1949. v. 4. 378 p.

## CHEMISTRY, ORGANIC

BEILSTEIN, FRIEDRICH KONRAD. Beilsteins Handbuch der organischen Chemie. 4. Aufl. Zweites Ergänzungswerk, die Literatur von 1920-1929 umfassend, herausgegeben von der Deutschen Chemischen Gesellschaft, bearbeitet von Friedrich Richter. Berlin, Springer-Verlag, 1944. 6. Band (revidierte Ausgabe). 1245 p.

BEILSTEIN, FRIEDRICH KONRAD. Beilsteins Handbuch der organischen Chemie. 4. Aufl. Zweites Ergänzungswerk, die Literatur von 1920-1929 umfassend, herausgegeben und bearbeitet von Friedrich Richter. Berlin, etc., Springer-Verlag, 1949. 9. Band. 890 p.

## CONSERVATION OF RESOURCES

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. Soil conservation, an international study. FAO agricultural studies no. 4. Washington, The Organization [1948] 192 p. +1 fold. map.

## CONTAINERS

AMERICAN MANAGEMENT ASSOCIATION. Cost controls for packing, shipping and warehousing. Effective use of cushioning materials. Packing for export. Warehousing for profit. Reduction of transportation damage claims. Packaging series number 25. New York, The Association [c1948] 31 p.

HUMMEL, W. R., and BEARDSELL, A. C. A primer on basic types of shipping containers and interior packing pieces. American Management Association. Packaging series number 26. New York, The Association [c1948] 24 p.

## COTTON

MERRILL, GILBERT R., MACORMAC, ALFRED R., and MAUERSBERGER, HERBERT R. American cotton handbook, a practical text

and reference book for the entire cotton industry. 2d rev. ed. New York, Textile Book Publishers, Inc. [c1949] 943 + 96 p.

### ECONOMICS

BURNS, ARTHUR EDWARD, NEAL, ALFRED C., and WATSON, D. S. Modern economics, with an introduction by Howard S. Ellis. New York, Harcourt, Brace and Co., 1948. 954 p.

### EDUCATION, HIGHER

TECHNISCHE HOCHSCHULE DARMSTADT. IKIA, Internationaler Kongress für Ingenieur-Ausbildung, Darmstadt 31. Juli bis 9. August 1947. Aussprachen, Vorträge, Zusammenfassungen. Darmstadt, Eduard Roether Verlag, 1949. 528 p.

### ELECTRIC INSULATORS AND INSULATION

WOODBURY, DAVID O. The varnished insulations story. New York, National Electrical Manufacturers Association. The Varnished Fabric and Paper Section [c1949] 88 p.

### FINANCE

HAROLD, GILBERT. An outline of corporation finance. Rev. ed. New York, Barnes & Noble, Inc. [c1946, reprinted 1948] 281 p.

### FUNGI

FOSTER, JACKSON W. Chemical activities of fungi. New York, Academic Press, 1949. 648 p.

### GUMS AND RESINS

HOWES, F. N. Vegetable gums and resins. Waltham, Mass., Chronica Botanica Co., 1949. 188 p.

### JAPANESE LANGUAGE

JAPANESE language dictionary of chemical phrases [Tokyo, Taiyodo, 1939] 363 p.

NEW dictionary of civil engineering and architecture. English-Japanese-German-French [Tokyo, Taiyodo, 1938] 276 p.

NEW dictionary of physical terms. English-Japanese-German-French [Tokyo, Taiyodo, 1938] 433 p.

ROSE-INNES, ARTHUR, comp. Beginners' dictionary of Chinese-Japanese characters, with common abbreviations, variants and numerous compounds. American ed. Cambridge, Mass., Harvard University Press, 1942. 507 + 25 p.

SANSEIDO'S New concise Japanese-English dictionary. Denver, Colo., Distributor: Jozo Sugihara [Photolithographed by The Smith-Brooks Printing Co., Denver, Colo.] n. d. 965 p.

TAIYODO'S Concise dictionary of mechanical terms; English-Japanese. Japanese-English. Tokyo, Taiyodo [1939] 354 p.

### MACHINERY

TERBORGH, GEORGE. Dynamic equipment policy. New York, McGraw-Hill Book Co., 1949. 290 p.

### PRICES

MILLS, FREDERICK C. The structure of postwar prices. Occasional paper 27. New York, National Bureau of Economic Research, 1948. 66 p.

### RESEARCH

BANCROFT, WILDER D. The methods of research; three public lectures delivered in the chemistry lecture hall of the Rice Institute, April 9, 10, and 11, 1928. The Rice Institute pamphlet, vol. XV, no. 4. Houston, Texas, The Institute, 1928. p. 167-352.

### RHEOLOGY

GREEN, HENRY. Industrial rheology and rheological structures. New York, Wiley, 1949. 311 p.

### SCIENCE—HISTORY

MEES, C. E. KENNETH, and BAKER, JOHN R. The path of science. New York, Wiley [c1946; 3d printing, 1948] 250 p.

### SOILS

BAVER, L. D. Soil physics. 2d ed. New York, Wiley, 1948. 398 p.

### SUGARS

SUNDMAN, JACOBUS. Sockerbisulfiternas egenskaper och kvantitativ bestämning av olika sockerslag, särskilt i sulfitavlut, med tillhjälp av Na-bisulfit. Avhandling godkänt för vinnande av doktorsgrad vid Tekniska Högskolan i Finland. Helsingfors [VTT. Rotaprintpaino] 1949. 144 p.

### THERMOCHEMISTRY

U. S. NATIONAL BUREAU OF STANDARDS. Selected values of chemical thermodynamic properties. v. 1. Series I-III [Washington, The Bureau, 1947- ] Loose-leaf.

### TRADE DIRECTORIES

PAPER and pulp mill catalogue; engineering handbook, 1949-50.

Collection of useful information for pulp and paper manufacturers, comp. by Harry E. Weston. 26th annual ed. Chicago, Fritz Publications, Inc. [c1949] 520 p.

SWEET'S file [1950] Process industries; a file of manufacturers' catalogs compiled especially for the use of engineers, operating and maintenance officials of the process industries. New York, Sweet's Catalog Service, c1948. Various paging.

**WATER—POLLUTION**

GREAT BRITAIN. *Department of Scientific and Industrial Research. Water Pollution Research Board.* Report of the Water Pollution Research Board, with the report of the director of Water Pollution Research for the year 1946, 1947. London, H. M. Stationery Office, 1948, 1949. 2v. 39 and 52 p.

**WOOD**

GLESINGER, EGON. The coming age of wood. With graphic illustrations by Henry Billings. New York, Simon and Schuster, Inc., 1949. 279 p.

**WOOD-PULP**

UNITED STATES PULP PRODUCERS ASSOCIATION. Wood pulp statistics, 1949 ed. New York, The Association, 1949. 199 p.

# Survey of Periodical Articles

*The following are abstracts of opinions expressed by writers in the technical journals. The Institute of Paper Chemistry takes no responsibility for the opinions here summarized.*

## AIR CONDITIONING

ANON. Air conditioning. Modern Lithography 17, no. 9: 26-9, 85, 87, 89 (September, 1949).

A discussion is given of the benefits of air conditioning in the pressroom, the platemaking, photographic, retouching and stripping, and finishing departments, offices, and storage areas, of the optimum conditions of paper and the air in the various departments, and of possible seasonal variations. R.R.

## ALCOHOL

ANON. Ethyl alcohol I. Chem. Eng. 56, no. 9: 331-2 (September, 1949).

A summary is given of the ethyl alcohol market (beginning with 1919) and its production; mention is made of cellulosic materials, including sulfite waste liquor, as a source. The future price situation will probably reflect competition between the various sources, as well as demand. A list is given of industrial alcohol plants, bonded warehouses, denaturing plants, and their location. R.R.

## ALKALINE PROCESSES—RECOVERY

COLLINS, T. T., JR., and WEST, P. H. Some recent developments in kraft recovery. Paper Trade J. 129, no. 9: 19-22; no. 10: 25-9 (Sept. 1, 8, 1949).

Recent developments in the recovery of sodium salt, sulfur gases, heat from the recovery furnace, and lime dust in the stack gases from the lime reburning operation are described. A summary is given of the past year's experience with the Venturi-scrubber at the Thilmany Pulp and Paper Co., Kaukauna, Wis. (*cf.* B.I.P.C. 18: 377), which has replaced an electrostatic precipitator for recovering the major part of the salt cake formerly lost out of the recovery-furnace stack. One great advantage of the scrubber over other methods of dust collection is that it makes possible the recapture of sulfur dioxide in stack gases and thus reduces atmospheric pollution. The installation of a 25-tube 9VG Multiclone unit and draft fan to clean the lime-kiln gases resulted in approximately 70% efficiency, based on the expected dust removal (*cf.* B.I.P.C. 18: 522). Although this particular application presents operational difficulties, as predicted by the manufacturer, it has justified itself by helping to alleviate a serious dust nuisance. Mention is made of the Inka, Ramén, and Tomlinson-B & W systems for recovering and utilizing the low-level heat in the stack gases (*cf.* B.I.P.C. 18: 497). The present standard practice is to pass the hot gases at 500-700°F. into a cyclone, disk, or cascade evaporator, where they evaporate and thicken the liquor. The two alternatives for maintaining the sulfur balance of the cooking liquor at a desired level are discussed, i.e., the addition of extra sulfur to the normal salt cake make-up and the prevention of the disproportionate sulfur loss from the system by aerating the weak black liquor and oxidizing the residual sodium sulfide and sodium sulfite in it. In addition to the reduction of the disproportionate loss of sulfur relative to sodium, the sulfate black-

liquor oxidation reduces equipment corrosion, mill odor, lime consumption for causticizing, and/or the use of an appreciable amount of caustic or soda ash for make-up chemical in the place of salt cake. Sources of make-up chemicals for kraft mills are considered, particularly "Ansul acid," a waste effluent from methyl chloride production containing sodium sulfate, sulfuric acid, water, and sodium chloride. 4 tables, 5 figures, and 6 references. R.R.

## ASSOCIATIONS

ANON. Australian paper technologists; summary of papers presented at 1949 Sydney conference. World's Paper Trade Rev. 132, no. 7: 412, 414, 416, 420, 422, 424; no. 8: 488, 491-2, 528, 530 (Aug. 18, 25, 1949).

Summaries of a number of papers are given, which were presented at the 1949 annual conference of the Australian Pulp and Paper Industry Technical Association held at Sydney. E.S.

BENSON, H. K., *and others.* Oldest Technical Section: a founder recalls early activities. Pulp & Paper 23, no. 10: 80, 82, 84 (September, 1949).

A review is given of the beginning of the Pacific Section of TAPPI which was organized in 1929. Meetings were poorly attended at first, only a few Coast mills co-operated, and those who participated in the programs were very careful not to divulge any information that might help a competitor. When the Crown Zellerbach organization decided to support the group in about 1933, other companies followed; now all mills participate in an exchange of scientific and technical information. A chronological list of the chairmen of the section is given. R.R.

## BARK

HUBBARD, JAMES K., and KURTH, E. F. Douglas-fir bark tannin. J. Am. Leather Chemists Assoc. 44, no. 8: 604-14 (August, 1949).

Douglas fir bark contains from 7.6 to 18.3% tannin. The highest percentages are found in the bark from the tops of young trees and the lowest in the bark from the butts of old trees. Leather produced with this tannin is light, even-colored, flexible, and well plumped. Inasmuch as a large proportion of trees now logged is second-growth, Douglas fir bark has prospects as a commercial source of tannin extract for leather manufacture. Floating of logs in mill ponds will cause some loss in the yield of tannin because of its solubility in cold water. The bark tannin belongs to the phlobatannin class and appears to be identical with the tannin occurring in Douglas firwood. It contains aliphatic and phenolic hydroxyl groups in the ratio of 1:3. A small amount of methoxyl is also present. The low yield of veratric acid, obtained upon oxidation of the fully methylated tannin, indicates that the catechol group is probably used as a link in polymerization. Extracted with the tannin and present in considerable amount in the aqueous-tannin extract is dihydroquercetin. The amount of this flavanone in the bark is greater than that occurring in the wood. The ultraviolet absorption spectra of phlobaphene and Douglas fir bark tannin are somewhat similar to that of dihydroquercetin. 4 tables, 4 figures, and 10 references. E.S.

## BARKERS AND BARKING

ANON. A record at Port Angeles; hydraulic barking of big log slabs. Pulp & Paper 23, no. 9: 87 (August, 1949); Newsprint Service Bur. Bull. no. 380: 5, 7 (Sept. 17, 1949).

Among several improvements at the Crown Zellerbach newsprint mill at Port Angeles, Wash., special reference is made to the transformation of an existing Stetson-Ross knife barker to a novel hydraulic barker for large slabs or cants up to 20 feet long. The planer head of the knife barker was removed and a hydraulic nozzle substituted. The present capacity is 8000 ft./hr., although with additional experience further improvements are expected to be possible. All hydraulically barked wood is sent to the sulfite mill. E.S.

### BOARD

HAMMER, HORST. Experience gained to date in the experimental manufacture of board with fibrous substitutes which have hitherto not been evaluated. Wochbl. Papierfabr. 77, no. 6: 168-9 (June, 1949). [In German]

Brief reference is made to experiments with potato, tomato, and tobacco stalks, poppy and mustard straw, and turnip tops as raw material in the manufacture of handmade board. The best results were obtained with potato tops, particularly as an addition to the regular furnish, although collection, transportation, and storage present serious difficulties. E.S.

### BOARD—STATISTICS

BETTENDORF, HARRY J. Paperboard mill industry statistics. Fibre Containers 34, no. 8: 128-36 (August, 1949); *cf.* B.I.P.C. 19: 77.

The 1948 production of paperboard balanced demand with a total that was nearly double the 1938 figure. Of the increase of almost 4.6 million tons over 10 years ago, about 2.5 million was containerboard, one million folding boxboard, about 0.1 million setup boxboard, and nearly one million miscellaneous. The backlog of orders ahead of production days reflected the decline of orders coming into the mills; these backlogs averaged about 21 days in 1946, 17.1 in 1947, 12.4 in 1948, and 7.5 in June, 1949. The effect in mill activity was distinctly noticeable in the last half of 1948 and especially so in the first half of 1949. Tonnage production in the first half of 1949 was approximately 11% below the first half of 1948 and about 6% below the first half of 1947. Because of the new mill capacity which came into production, average mill activity was only 80% of capacity in the first half of 1949; it was over 100% for the same periods of 1947 and 1948. The decline in demand for paperboard and its products brought a decline in board prices, particularly for containerboard. The price of boards made chiefly from a mixed wastepaper furnish declined more than that of pulp-surfaced grades. The production of containerboard grades of Fourdrinier kraft liner increased in 1948, that of jute liner declined, cylinder kraft was about the same, and 0.009 corrugated kraft continued to decline. In boxboards, folding grades declined for the second consecutive year and setup board production increased. Pulpwood was in exceptionally good supply in 1948 and by the middle of the year, there was a surplus pulp supply. Since the fall of 1948, wastepaper supplies have glutted the market. The advent of new capacity for board production and the improvement of raw-material supplies have resulted in improved containers and other end products. Prospects for high activity are very good, especially if the development of new uses for paperboard is resumed. The data are tabulated and shown graphically in numerous tables and charts. R.R.

### BOARD DRYING

LATIMER, ROBERT A. Direct gas flame aids board drying. Am. Boxmaker 38, no. 9: 26 (September, 1949).

Gas burners recently installed by the Los Angeles Paper Corp., Los Angeles, operate during the light load season on straight natural gas and can be converted to kerosene during the winter high peak-load season. They speed up board drying to yield from 300 to 350 additional ft./min. The gas flame is applied directly at an angle of 90° to each side of the containerboard sheet as it passes through steam-drier rolls. In addition to drying, the direct flame consumes the natural rosin deposited on the paper and prevents its deposition on the metal steam-drying rolls, where it acts as an insulator and prevents smooth even drying; burning the rosin also results in a smoother flow of the sheet through the rolls and in decreased web breakage. The paper is more evenly dried than when the driers are not used. Heating costs per 1000 feet of board have not been increased because less gas is used to maintain steam in the drying rolls. A description is given of the burners and their operation. R.R.

## BOARD MILLS

ANON. An unusual board mill project: extensive re-design. Pulp & Paper 23, no. 10: 86, 88, 90, 92, 94 (September, 1949).

The recently completed modernization and expansion program of the Sidney Roofing & Paper Co., Ltd., Victoria, B.C., included the construction of a slush stock preparation and storage plant, the redesign of a cylinder machine, the construction of a double machine room for this unit and the No. 1 paper machine which will be relocated, and the construction of a steam plant having a capacity of 60,000 lbs./hr. An illustrated review is given of the additions, including a description of the stock flow. Six concrete pulp-storage chests with a total capacity of 42 tons of 4% consistency stock are equipped with propeller agitators. The clean stock is pulped in a batch Hydrapulper; wastepaper stock passes through a continuous Hydrapulper equipped with a continuous ragger and automatic junk remover. The thickeners have all-steel, Heresite-lined vats and are fitted with specially designed molds. Three of the seven beaters are used for No. 2 machine stock; the stock can be transferred from any chest to any beater. E. D. Jones jordans are used for liner and subliner stock and a No. 1 Jones jordan with adjustable casing is used on filler stock. The six cylinder machines are designed for counterflow operation and have the same mold construction as the thickeners. A 500 gal./min. saveall reclaims stock from the white water and discharges it to the filler chest. The machine press section consists of a suction roll and three sets of press rolls. A duplex slitter and cutter was designed to produce sheet board. Two Yarrow-type marine boilers were added to meet the requirements of the No. 2 machine. Wood refuse can be burned in Dutch ovens in front of the boilers and oil can be burned from the rear to fire this setting, either in conjunction with or independently of each other. A brief history of the company and a list of the sources of the new equipment are given. R.R.

NUTTER, A. P., and RAWLINGS, J. R. Modernization at Upson Company. Paper Trade J. 129, no. 12: 79-81 (Sept. 22, 1949).

A summary is given of the modernization program begun by The Upson Co., Lockport, N.Y., in 1945. The first objective was to increase the panel capacity of the board mill by approximately 25% through the installation of a new machine hood, vapor-absorption system, machine-room ventilating system, and other equipment. The second step included the installation of new 450-pound, 550° true temperature boilers fired by dumping grate-type spreader stokers. The final part, which should be completed within 10 months, includes a turbine generator designed for steam conditions of 400 pounds, 550° F. true temperature, and 30 p.s.i. gage exhaust pressure and the changing of all drives in the board-machine room and boiler plant to 60-cycle

operation. The construction and operation are considered and a list is given of suppliers of material and equipment. R.R.

### BOARD MILLS—WASTE LIQUOR

GEHM, HARRY W., and MORGAN, PHILIP F. A novel high rate anaerobic waste treatment system. Sewage Works J. 21, no. 5: 851-5 (September, 1949).

High-rate anaerobic digestion is a very efficient method for obtaining high B.O.D. reductions at a relatively low cost if the waste has, or can be conditioned to have certain characteristics, the most important of which are an initial B.O.D. in excess of 500 p.p.m., a nitrogen-carbon ratio of at least 1 to 20, a high buffer capacity in relation to organic substances that form volatile acids on decomposition, organic matter most of which is readily decomposable, preferably a low sulfur content, relative freedom of settleable suspended matter, a neutral pH range, and the absence of inhibitors. A report is given of a comprehensive study of the process as applied to strawboard waste, which meets these specifications after the coarse suspended matter is removed. Under laboratory conditions settled waste was digested at high rates between 25 and 37° C. B.O.D. reductions in excess of 90% were obtained under ideal conditions, which included agitation. The seed sludge did not increase appreciably and therefore would not present a disposal problem. No diminution in seed effectiveness was observed throughout a year's operation. The laboratory work was so successful that a pilot-plant study is in progress to determine the optimum waste-reduction rates obtainable with continuous operation and the best design and operating techniques. An agitated rectangular digester is used, followed by a clarifier and means for returning the sludge continuously. The digester, with a total capacity of 2600 cu. ft., is divided by baffles into three sections, each of which has a separate floating gas collector and a separate agitator. An air heater maintains satisfactory temperature conditions. Diagrams are given to illustrate the old and new conventional treatments. 4 references. R.R.

TRUBNICK, EUGENE H. Discussion [of article by Gehm and Morgan] Sewage Works J. 21, no. 5: 855-8 (September, 1949).

The author considers the anaerobic digestion of soluble organic industrial wastes in general, with specific references to yeast wastes. 7 references. R.R.

### CAUSTICIZING AND RE-CAUSTICIZING

DENISOV, Y. A. Fundamentals of a scientific method of causticizing green liquor. Bumazh. Prom. 24, no. 3: 6-11 (May-June, 1949). [In Russian]

Several formulas are given for the determination of percentage causticization in the kraft process, but all are said to be unreliable. A new, simple, accurate method is presented for making the determination; the formula takes the form: $K = 100 - \frac{Na_2CO_3 \text{ in white liquor}}{Na_2CO_3 \text{ in green liquor}} \cdot 100$, where K represents the degree of causticization. The sodium carbonate contents are obtained by usual analytical procedures. 2 figures and 5 tables. E.G.S.

### CELLOPHANE

ANON. Long life to Brazils. Modern Packaging 23, no. 1: 101 (September, 1949).

Unshelled Brazil nuts, which were formerly susceptible to mold, insect infestation, and excessive weight shrinkage when sealed in packages, are

now specially treated and successfully marketed in cellophane-overwrapped trays and cellophane bags. Heat-sealing, moistureproof, duplex 300-gage cellophane is used for the bags and 450-gage MST film for the tray overwrap. The preglued, double-end, reinforced-bottom, paperboard tray flats are opened by hand; overwrapping and heat sealing are mechanical. R.R.

### CELLULOSE—DEGRADATION

DERRETT-SMITH, D. A. Solubility number: a measure of cellulose degradation. J. Textile Inst. 40, no. 7: P622-6; discussion: P626-7 (July, 1949).

A modification of the original solubility-number test devised by Nodder (*cf.* B.I.P.C. 2: 93-4) is described; the two principal changes involve the doubling of the ratio of the 10 *N*-2 *N* caustic soda solution to the weight of the sample and an increase in the temperature of the solution from 15 to 17.5° C. E.S.

### CELLULOSE—HEAT OF COMBUSTION

OREL, RODOLPHE. Heating value and chemical composition of cellulosic material. Chimie & industrie 61, no. 3: 240-5 (March, 1949). [In French]

On the basis of results obtained for 21 different materials (sawdust of beech, poplar, and pine, rice straw, almond shells, olive pits, and sunflower-seed hulls) by analysis and combustion in a bomb calorimeter, the author has developed relations which are consistent for all the test substances. Empirical relations are introduced for calculation of total heating value, net heating value, oxygen content, hydrogen content, and elementary analysis, as functions of the total carbon content; the degree of error is specified for each formula. The article is concluded with a comparative definition of the nature of the hydrolysis of cellulosic material and an analysis of the quantitative influence of parameters on hydrolysis. 2 figures and 4 tables. E.G.S.

### CELLULOSE—OXYCELLULOSE

ENTWISTLE, D., COLE, E. H., and WOODING, N. S. The autoxidation of alkali cellulose. Part I: An experimental study of the kinetics of the reaction. Textile Research J. 19, no. 9: 527-46 (September, 1949).

The kinetics of the uncatalyzed oxidation of alkali cellulose by molecular oxygen (autoxidation) have been studied. It is shown that a linear relationship exists between the copper number of cellulose regenerated from a freshly prepared alkali cellulose and the initial rate of autoxidation of the alkali cellulose. As the reaction proceeds, however, the rate approaches a constant value which, under given conditions, is independent of the initial copper number. The extent of peroxide formation during the reaction depends upon trace concentrations of various heavy metals. The effects of temperature, oxygen pressure, and alkali cellulose composition on reaction rate are discussed. The results are consistent with the present concept that autoxidation processes are free-radical-propagated chain reactions. 6 tables, 19 diagrams, and 29 references. E.S.

### CELLULOSE ETHERS

MICHEEL, F., and EWERS, J. Synthesis of compounds of cellulose with proteins. Makromol. Chem. 3, no. 2/3: 200-9 (July, 1949). [In German]

Synthetic compounds of cellulose with proteins are of interest with regard to the chemistry of macromolecules as well as for their immuno-chemical properties. In the present work the Curtius azide-method was utilized, as had been done previously to synthesize pecto-protein compounds. The first starting material was an oxidatively degraded cellulose, which was combined with gelatin to give a very heterogeneous product. The procedure was then modified so that a starting material with a higher degree of polymerization could be used. Alkali cellulose was prepared under nitrogen from filter paper and converted with chloroacetic acid to its glycol acid ether (carboxymethylcellulose). By the azide method this was condensed with gelatin and with pseudo-globulin (from horse blood). In other experiments tyrosin was also incorporated in the carboxymethylcellulose-protein compound. In all the syntheses by the latter procedure two types of products were obtained. One was soluble and poor in carbohydrate content, so that each cellulose molecule was combined with several protein molecules. The other was insoluble and rich in carbohydrate content, so that several cellulose molecules were combined with each protein molecule. The testing of the immuno-chemical properties of these materials has not yet been completed, and will be reported in a later paper. 9 footnotes. M.A.H.

## CHEMICAL PLANTS—LOCATION

McLAUGHLIN, GLENN, and ROBOCK, STEFAN. Why industry moves South. Southern Pulp Paper Manuf. 12, no. 9: 44-6 (September, 1949).

A summary is given of the findings in the report of the National Planning Association Committee of the South, entitled "Why industry moves South." The plant location study is based on 88 new constructions in 13 southern states; of these, 83 are branches of well-established concerns, three are relocations, and two, completely new enterprises. Most decisions for locating in the South were made for dollar-and-cents advantages, such as low costs or high sales volume, or both; materials and energy resources, availability of an adequate labor supply, and transportation facilities were other major factors. Secondary locational influences were attitudes toward industrialization, the operation of local government, and the attractiveness of the community. The efforts of states and localities to attract industry by extensive advertising campaigns or through the offer of special inducements are reported to have had little effect upon local decisions. The needs for industrialization of the postwar South are by no means fulfilled and imbalance must be remedied in order to strengthen the economic structure of the region. E.S.

## CHEMICAL TESTING—BLACK LIQUOR

BROWNING, B. L. Determination of total and active alkali in sulphate black liquors. Tappi 32, no. 9: 418-19 (September, 1949).

A comparison was made of active and total alkali contents of seven sulfate black liquors using several methods, including TAPPI Standard T 625 m, a modification of this standard involving the addition of formalin, and the Torrey-Nelson procedure; the results are tabulated. The active alkali as determined by the formaldehyde modification was lower than by the TAPPI Standard method. It is believed that the modification values are more nearly correct. The sodium sulfide values obtained by doubling the titration difference with and without formaldehyde were always less than the values obtained by the evolution method by an average value of 8%. However, titration with and without formaldehyde offers a quick and convenient method of sulfide determination; if the observed values are increased by approximately 8%, relatively good agreement with values by the evolution method should be

found. The Torrey-Nelson procedure gave total alkali values which averaged 18% higher than those obtained by the conductometric method. If the Torrey-Nelson titration is carried out to a pH of 3.2 instead of 2.4, the total alkali values will be close to those obtained by the conductometric method. R.R.

### CHEMICAL TESTING—CELLULOSE

ZAPF, F. Macromolecular compounds. [333] The $K_m$ value of wood-pulp cellulose nitrate and wood-pulp cellulose. Makromol. Chem. 3, no. 2/3: 164-75 (July, 1949). [In German] *cf.* B.I.P.C. 19: 469-70.

By comparative viscometric and osmometric measurements, Staudinger and Husemann [Naturwissenschaften 29: 534 (1941)] have established that the D.P. of unfractionated wood-pulp nitrates cannot be calculated with certainty according to the Staudinger rule, $[\eta] = K_m\bar{P}$, since $K_m$ for wood pulp-cellulose nitrate solutions does not have a constant but a variable value. The author illustrates with values determined on a number of pulps from different sources, a large proportion being unpublished data obtained by Husemann. Only by regeneration from cuprammonium solution do the $K_m$ values show a regularity comparable to that of cotton cellulose. An acid-hydrolyzed cotton and a beech sulfite pulp were nitrated by the same procedure and the nitrates, in acetone solution, were then carefully separated by fractional precipitation into eight fractions for the cotton nitrate and 10 fractions for the wood pulp nitrate. The D.P. of each fraction was measured viscometrically and osmometrically. Although the $[\eta]$ values were about the same for the unfractionated samples, the osmometrically determined D.P. was over twice as great for the cotton nitrate as for the wood-pulp nitrate. On the other hand, the $K_m$ values for the fractions were comparable in both series. By plotting the distribution curves, an essential difference between the two materials became evident. Cotton cellulose shows a single maximum, the polymer homologous mixture presumably being derived from a uniform substance. Wood-pulp cellulose shows two maxima, one in the region of a higher D.P., the other at a low D.P., so that it appears to be formed from two components. The chemical nature of the low D.P. component is still in question. If the low molecular portion is removed, or if the spread in D.P. is diminished by degradation, the $K_m$ values for the unfractionated material may approach the values for cotton nitrate. This might explain the "normalizing" effect of regeneration from cuprammonium, and it is under investigation. Changes in the molecular distribution during pulping, purification, and other treatments may alter the viscosity relationships of wood pulp and complicate the technical aspects of manufacturing processes. 21 footnotes. M.A.H.

### CHEMICAL TESTING—PULP—CUPRAMMONIUM VISCOSITY

HOWLETT, F., and BELWARD, D. Rapid methods for determining the cuprammonium fluidity of cotton cellulose. J. Textile Inst. 40, no. 7: T399-406 (July, 1949).

Following a summary of published methods for determining the cuprammonium fluidity of cotton cellulose, the authors describe two rapid methods which are extensions of the established British Cotton Industry Research Association technique. In one method dried cotton is dissolved by hand-shaking it for 10 minutes in a bottle incompletely filled with cuprammonium and pyrogallol in water. The solution is filtered and the fluidity determined at 20° C. Slightly less than 30 minutes is required for the procedure. In the second method, damp cotton is dissolved in cuprammonium for two hours. The fluidity is determined at 20° C., the dry weight of the cotton used is calculated and expressed as grams of dry cotton/100 cc. of solvent, and the

fluidity is converted to that figure at 0.5% concentration by the use of a nomograph which is given. Although the latter method requires about 2.5 hours, it is advantageous in that normal oven drying is used and the filtration essential in the first method is eliminated. Only loose cotton has been considered, although the authors believe that the procedures can be applied to normally finished fabrics. Details for the construction of the nomograph are appended. 1 figure, 7 tables, and 10 references. R.R.

## CHEMICALS

ANON. Caustic and chlorine. Chem. Eng. 56, no. 9: 125-6 (September, 1949).

The five western producers of caustic soda and chlorine have an estimated installed daily capacity of 500-550 tons of chlorine, of which about 44% are consumed by the pulp and paper industry. Their advantages are their good labor-management relations, transcontinental freight rates precluding the westbound movement of heavy-tonnage, low-price commodities, their location in the country's most rapidly growing industrial section, the increasing use by western farmers of agricultural chemicals, reasonable power costs, and a steady source of well-trained technicians from the good western universities. A more diverse market, a better freight-rate structure, and lower raw material costs are still needed by the industry. R.R.

GIBSON, T. B. Heavy inorganic chemicals. Chem. Eng. 56, no. 9: 124-5 (September, 1949).

The expansion in the manufacture of heavy chemicals in the West since the end of the war is described, including three new plants to recover elemental sulfur, which will increase production by 400-425 tons daily. A more advanced over-all industrial integration is still needed in this area. R.R.

## CONTAINER INDUSTRY

BETTENDORF, HARRY J. Statistical summary of the paperboard group of industries. Fibre Containers 34, no. 8: 72, 74, 76, 78, 83-4, 86, 88-90, 95-6, 98, 100-2, 105-6 (August, 1949); *cf.* B.I.P.C. 19: 82-3.

The initial summary covers the significance of paperboard as the mass-production package through a condensed historical approach, the measurement of the size and scope of paperboard fields, today's general trends and problems, fibrous raw materials, general trends, details on fibrous raw materials, broad growth of board and containers, and the relative growth of board and paper. The year 1948 was a year of declining trends in the paperboard fields; the drop in demand represented the first real postwar balancing of supply and demand in paperboard products. An improvement in the supply and cost of fibrous raw materials (waste paper and pulp) was followed by improved paperboard quality and improved containers of all kinds. With decline in demand and raw-materials prices, board and box prices have dropped from the highs reached in 1948; the drop in box prices, in general, was higher than that in board prices. A problem to be faced in the future is the high replacement cost of buildings and equipment; depreciation rates established some years ago are not providing the true cost of today. Of the total of 10,853,906 tons of board produced in 1948, the largest portion is for container-board usage (45.8%), followed by folding boxboard (19.6%), miscellaneous board (14.9%), building board (11.8%), and setup boxboard (5.9%). Taking the year 1929 as a basis of 100%, paperboard has grown to 243.8% in 1948, and paper to only 167.4% during the same period. The total per capita paperboard and paper production in 1948 amounted to 296.5 pounds, of which

146 pounds were paperboard, and 150.5 pounds paper. Numerous tables, diagrams, and charts. E.S.

LEWIS, CHARLES A. Fall outlook for packaging industry. Packaging Parade 17, no. 200: 14-16, 18-19, 62-7 (September, 1949); Shears 67, no. 681: 7-8, 10-11, 66 (September, 1949); Am. Boxmaker 38, no. 9: 16-18 (September, 1949).

Except for the omission of the section on plastic and transparent flexible packaging, the article is similar to the September, 1949, issue of the *Quarterly Containers and Packaging Industry Report* issued by the Department of Commerce. R.R.

## CORROSION

WILLIAMS, TREVOR I. Battle against corrosion: air and moisture rendered harmless. Indian Pulp and Paper 3, no. 12: 479, 483 (June, 1949); *cf.* B.I.P.C. 19: 767, 862.

Such protective methods against corrosion as painting, plating, greasing, coating with Glosscoat—a plastic product—or a rubber latex and sodium benzoate composition, and wrapping with vapor-phase inhibitor (VPI) papers are discussed. R.R.

## COST—ACCOUNTING

MOORE, W. CLEMENT. Mr. Box Manufacturer: here are some poor accounting practices you should correct. Shears 67, no. 681: 14 (September, 1949).

The author stresses the importance of having separate accounts for productive and indirect labor as a means of securing accurate information regarding the relative costs of production allotted to direct labor, indirect labor, and supervision. Real estate taxes should be distributed according to the space occupied by the factory proper, the office (administrative expense), and garage (delivery). The standard hourly production by machine or by man should be honestly measured, a fair living wage allowed for such production, and payment made for anything above the standard average. On such a basis a pay roll increase means increased production and a lower unit cost, and is good economics. R.R.

## COTTON

KRIEBLE, JAMES G., and WHITWELL, JOHN C. Degree of polymerization as evidence of the damage to cotton in mechanical processing. Textile Research J. 19, no. 9: 556-62 (September, 1949).

Mechanical processing of cotton causes two types of damage: the first type is physical in nature, resulting from the breaking and bruising of fibers; the second type is chemical in nature, as shown by a decrease in D.P. This change in D.P. is brought about by a mechanical-chemical rupture of molecular bonds and not through a thermal mechanism. A quantitative estimate of the relative damage occurring in each mechanical operation investigated is presented. A loss in D.P. of 30% was measured as a result of the mechanical conversion of an Empire seed cotton into yarn. 15 references. E.S.

## DE-INKING

BAARS, HANS. The recovery of clean fibers from printed waste paper. Wochbl. Papierfabr. 77, no. 8: 233-4 (July 31, 1949). [In German]

A description of the Becker-Partington deinking and stuff regeneration process is given (*cf.* B.I.P.C. 10: 452); a sketch of the most recent construction is included. Reference is also made to the Porritt washer (U. S. patent 2,347,504 [April 25, 1944]) for smaller outputs, such as 50 tons per week, as required in many fine paper mills; an outline of its operation is supplemented by a diagram. E.S.

## DIATOMACEOUS EARTH

SERGEANT, S. V. Diatomite in the paper mill. Indian Pulp and Paper 3, no. 12: 469-70 (June, 1949).

A discussion is given of the use of diatomaceous earth, or kieselguhr, the origin of which is considered, for overcoming pitch and slime troubles, reprocessing board waste containing asphalt, deinking, improving sheet formation, minimizing paper slippage, providing faster drainage on the wire, with titanium as an opacifier, and, separately, as filter aids for filtering raw water and recovering fiber and loading material from mill effluents. R.R.

## DIELECTRICS

DUBILIER, WILLIAM. Development, design and construction of electrical condensers. J. Franklin Inst. 248, no. 3: 193-204 (September, 1949).

The author discusses the development of electrical condensers, including the historical Leyden jar invented in 1746, and mica, paper, electrolytic, and ceramic condensers. Paper condensers employ impregnated paper as the dielectric; they are extremely difficult to engineer and to produce. The strict material controls begin with the paper manufacture (including close control of ash, acidity, alkalinity, porosity, pinholes, residual moisture, thickness, metallic impurities, etc.) and apply also to the metal foil and impregnating agents, such as waxes, oils, chlorinated diphenyl preparations, and others. All materials must be kept free from contamination from start to finish. The completed unit is tested at approximately twice, and its terminals at five times, its normal operating voltage. It is then passed through long heated ovens for detection of minute flaws. Finally, the unit is given an accelerated heat test under power overload. Examples of some unforeseen problems and their solution are described. 5 illustrations. E.S.

WEHE, H. G. Metallizing paper for capacitors. Bell Labs. Record 28, no. 9: 317-21 (September, 1949).

New metallized paper capacitors are made with two sheets of chemically pure kraft paper lacquered on one side to improve dielectric strength, dried, and then metallized by means of metallic vapor in vacuum. An unplated margin is left along an edge of one sheet of the treated paper and along the other edge of the second sheet. The sheets are then rolled together to form a capacitor with about one third the volume for the same capacitance as the conventional capacitor composed of two aluminum strips separated by two sheets of the kraft paper. Terminals are provided by spraying a bridge of metal across the two opposite ends of the final assembly to provide a base for later soldering of lead wires. An illustrated description is given of the laboratory manufacture of the metallized capacitor. To test the metallized paper for electrical spots on a sampling basis, it is directed over large insulated rolls which are electrically charged to burn away the vaporized zinc electrode at any weak spots or conducting particles in the paper. This fuse-like action of the metal film is called "self-healing." R.R.

## DIELECTRICS—TESTING

ENDICOTT, HAROLD S. Electrical testing of capacitor paper. Gen. Elec. Rev. 52, no. 9: 28-35 (September, 1949); *cf.* B.I.P.C. 11: 134.

A description is given of apparatus for making dielectric constant and power-factor tests on unimpregnated capacitor paper, which consists essentially of suitable electrodes, a vacuum drying chamber, and a 60-cycle bridge for making the measurements. The procedure, requiring only two days for completion, is discussed. Very close correlation is obtained between tests on the dry unimpregnated paper and on the capacitors made with it. It is shown that the dielectric constant of kraft capacitor paper decreases as the temperature decreases and an explanation is given of the capacitor paper-impregnant system, which permits the quantitative calculation of the impregnated-paper power factor from the power factors of the constituents. 6 tables, 16 figures, and 9 references. R.R.

## EDUCATION

ANON. Workers' education in America. Indian Pulp and Paper 3, no. 12: 485-7 (June, 1949).

A general discussion is given of the educational opportunities offered by U. S. unions to its members, including opportunities for discussion, leadership, and cultural development, publication of union literature, the establishment of labor institutes, and the production of labor films. Such courses as those offered by Harvard University to union-selected people and the School of Industrial and Labor Relations of Cornell University and scholarships offered by certain unions are mentioned. R.R.

## ELECTRIC PRECIPITATORS

ROBERTS, L. M., and BEAVER, C. E. New developments in Cottrell electrical precipitators for kraft stack gases. Paper Trade J. 129, no. 12: 94-6 (Sept. 22, 1949); *cf.* B.I.P.C. 19: 845.

After reviewing the application of the Cottrell electric precipitator for the recovery of chemical compounds from sulfate pulp recovery furnace gases, the authors describe new major developments in equipment design. A design has been developed in which the insulator compartments are on the roof of the precipitator, outside the gas stream. This retains the desirable flue arrangement used formerly, removes the possibility of localized condensation and corrosion arising from the air stream in the compartments, and requires about seven feet less tile shell than location of the compartments within the precipitator, with an appreciable decrease in initial cost. A liquor tank has been located immediately under the electrodes as a means of dust collection in place of the hoppers formerly used. Black liquor flows into the tank, is agitated, and dissolves or suspends the dust that is rapped from the electrodes. The process is continuous. This improvement eliminates hopper maintenance and cleaning, obviates the problems connected with handling the dry dust, and reduces the over-all first cost. Although the location of electrical equipment in the substation and the use of mechanical-type rectifiers are still popular, equipment has been developed which employs either mechanical or vacuum tube-type rectifiers and is installed in cabinets. The location of the cabinets near the top of the precipitator eliminates the need for special high-tension cable and enclosure of the equipment in its own housing reduces maintenance. Control panels can be placed on the cabinets or installed in the recovery room; location near the furnace control board assures ready control of the precipitator. R.R.

## FIBER—STRUCTURE

CLIBBENS, D. A. The structure of textile fibres. IV. The structure of cotton. J. Textile Inst. 40, no. 5: P426-43 (May, 1949).

The author reviews the existing knowledge of the molecular structure of cotton (including chain links, end groups, and repeating units), the reactions of the alcohol groups in esterification, ionization, hydrogen bonding, and oxidation, and the fine or x-ray structure of cotton, including the accessibility of groups. E.S.

HAAS, H. Investigations on the morphological and chemical structure of wood cellulose fibers. Makromol. Chem. 3, no. 2/3: 117-31 (July, 1949). [In German]

From microscopic evidence on fibers of various wood species and on the separated total carbohydrate portion or "skeleton substance," using swelling and solution phenomena in sulfuric acid, dissolving treatments with dilute cuprammonium, xanthation in caustic soda, and acetylation in acetic acid, a general concept of the physical and chemical composition of the fiber, particularly of the secondary cell wall, is presented. The thickening or secondary cell wall consists essentially of three layers which are built up of threadlike fibrils, lying in steep spirals along the fiber axis in the middle layer, but nearly perpendicular to it in both the outer and inner layers. The outer layer, which is deposited just inside the original or primary cell wall of the fiber, contains hemicelluloses. After treatment with dilute cuprammonium, a specific solvent for hemicelluloses, the outer layer was no longer seen in the photomicrographs. If cellulose was also present it was indistinguishable in its behavior from the middle layer. Lignin does not appear to be an essential constituent of this layer. The inner layer, next to the central canal or lumen of the fiber, consists of substances which by hydrolysis and acetylation (concentrated acid conditions in general) form difficultly soluble compounds of the type of sugar humuses. Colloidal disintegration particles from this layer may contribute to haziness of commercial wood pulp-acetate solutions. The middle layer is the main portion of the secondary cell wall and the source of the cellulose. Softwoods show lignin in the middle layer, hardwoods little or none. It is postulated that in softwoods the fibrils are sheathed in lignin, probably chemically combined with cellulose rich in foreign groups concentrated on the surface of the crystallites, and that this latter material may even be a precursor of lignin. Physically, the middle layer is built up of fibrils, lamellas, and transverse spirals. On dissolution, cleavage surfaces form along the transverse spirals, and eventually the fiber breaks into short pieces, which have frequently been observed and described. The breaking into these units apparently occurs because they are separated by substances or linkages which react more rapidly than the particles themselves. It is not a question of hemicelluloses in this layer; amorphous cellulose or periodically occurring different linkages in cellulose which are more reactive chemically are possibilities. More exact information depends on a clearer elucidation of the fine structure of cellulose. 32 footnotes. M.A.H.

HOWLETT, F. Structure of textile fibres. II. Fibres and plastics. J. Textile Inst. 40, no. 3: P241-7 (March, 1949).

A popular description is given of the arrangement of molecules to form flexible or rigid plastics. At present only a few plastics are converted to synthetic fibers, although an increase in the latter is predicted, corresponding to an increase in the number of different plastics which are expected to be developed in the future. E.S.

PEW, J. C. Membranous substances in common heartwoods. J. Forestry 47, no. 3: 196-9 (March, 1949).

The heartwood structure is frequently infiltrated with extraneous components, which are often not extractable with neutral solvents. Means have been found to isolate such deposits from wood. Of four methods used, the most satisfactory one is similar to the Ross-Hill-Potter method, in which the cell wall is dissolved by means of sulfuric acid and formaldehyde, whereas the deposits remain virtually unchanged. These deposits or membranous substances may then be isolated by diluting the acid solution with a mixture of equal parts of acetone and Cellosolve, and centrifuging. A series of eight micrographs is given, showing deposits from western hemlock, Douglas fir, white spruce, white pine, and blackjack oak heartwoods. L.E.W.

SIMMENS, L., and URQUHART, A. R. The structure of textile fibres. I. Why are fibres fibrous? J. Textile Inst. 40, no. 1: P3-10 (January, 1949).

A popular description is given of the way in which the long chain molecules are formed, with several examples of the effect of the atomic groupings within the molecule on the properties of fibers. E.S.

WOODS, H. J. The structure of textile fibres. III. Fibre properties and molecular arrangement. J. Textile Inst. 40, no. 4: P363-9 (April, 1949).

The arrangement of molecular units in fibers is discussed in a popular manner and an explanation is offered of the way in which even the same kind of chain molecules can modify the fiber properties. Particular attention is given to flexibility and swelling in relation to structure. E.S.

## FIBER—TESTING

KILPPER, WILHELM. Development of a rapid industrial method for fiber length determination in a fiber mixture. Wochbl. Papierfabr. 77, no. 6: 160-4 (June, 1949). [In German]

Evaluation of the degree of beating of a fiber furnish by the microscopic determination of the average fiber length is, although accurate, too time-consuming; since the fractionation methods are not satisfactory, it has become necessary to develop a simplified microscopic procedure. The method is based on the premise that, for microscopic fields of equal fiber distribution, a considerably larger number of fibers with a relatively large average length cross this field than those with a relatively small average length. Based on this fact, a single equation has been developed, from which the average fiber length can be calculated from the radius of the field of vision selected, the number of fibers within the field, and the number of fibers crossing the field. Since the average fiber length cannot be determined by this method with sufficient accuracy to be expressed to a tenth of a millimeter, the average lengths are expressed in arbitrary length classifications from 1 to 10, and curve charts can be developed for a given diameter and radii of projection of 15-25 cm. of fields of vision; hence, the length classifications can be determined directly from N/S, where N is the number of fibers inside a given circle of vision, and S is the number of fibers crossing the circle. 6 figures. J.H.G.

## FLAX

DIXON, L. F. The growth of the U. S. seed flax fibre industry. Chemurgic Digest 8, no. 8: 9-13 (August, 1949).

The author presents data on the seed-flax fiber industry from 1937 to the

present time and describes some of the methods used in developing the raw material industry and supplying the domestic cigarette-paper industry with the flax fiber. Since the industry began in 1937, an estimated 2,183,300 tons of seed-flax straw has been purchased. Fiber consumption for cigarette and fine papers has apparently leveled off to about 60,000 tons annually. About 27% of the weight of the straw processed is the fiber; the remainder, or shives, is partially utilized as fuel, wallboard stock, feed, and bedding. R.R.

## FOLDING BOXES

ANON. Cartons ideal for peach prepack. Am. Boxmaker 38, no. 9: 21 (September, 1949); *cf.* B.I.P.C. 18: 439-40.

A folding carton with a transparent window, such as that manufactured by the Container Corp. of America, is the best consumer carton for peaches. It will protect the fruit during transit and in the store and still permit visibility. The carton described has a Lumarith window, which permits the contents of the package to "breathe." General suggestions are given for a satisfactory peach carton. Marketing tests have shown that boxed peaches lead bulk sales by 12 to 1 where there is no price differential. R.R.

DICKEY, ROGER C. The folding box—what is it? Graphic Arts Monthly 21, no. 9: 34, 36, 116 (September, 1949).

A folding box is defined as any box made of folding boxboard and which is customarily delivered flat to the customer. A setup box is made from rigid board and furnished to the customer in setup condition. The advantages of each are given and illustrated descriptions are included of the lock-corner, glued side-seam, and collapsible folding boxes. R.R.

DICKEY, ROGER C. Pre-folded folding boxes. Graphic Arts Monthly 21, no. 9: 81-2 (September, 1949); *cf.* B.I.P.C. 19: 238-9.

Typical 180-degree prefolded folding boxes are five-cent Chiclet gum, gelatin, and soap-powder boxes. By making 180-degree folds on the glue lap prior to gluing, then on the first (or glue-lap) and third crease, and finally on the conventional folds (second and fourth crease), a box results which opens easily, quickly, and accurately. Such containers make it possible to obtain maximum speed with packaging machines by offering less resistance to opening and eliminating much of the usual jamming and spoilage which occurs with the conventional folding box (prefolded on the second and fourth crease only). R.R.

FOLDING PAPER BOX ASSOCIATION OF AMERICA. Prepackaging summary including test results of low-volume items. Shears 67, no. 681: 17 (September, 1949); *cf.* B.I.P.C. 19: 771.

Carton and refrigeration requirements are given for prepackaging wax beans, spinach, pears, berries, green peppers, tomatoes, celery, lettuce, and potatoes. In general, the cartons should provide space for price and weight, brand identification, and easy filling and closing by hand. In some cases, the construction and board weight are determined by the shape and susceptibility to bruising of the item to be packaged. R.R.

LILLIE, A. R., and BETTENDORF, HARRY J. Folding box industry statistics. Fibre Containers 34, no. 8: 150, 152, 154, 156, 158, 160, 162, 164, 166, 168-72 (August, 1949); *cf.* B.I.P.C. 19: 85-6.

Statistical data for the folding-box industry are presented in numerous tables and graphs, chiefly covering the last ten-year period; these show the

tremendous growth of the industry across the years, which growth has leveled off somewhat from 1947-49. Tonnage consumption (2,208,694 tons) in 1948 was about 1% below 1947, but over 12% higher than in 1938. This growth is not as high as the growth in dollar value of shipments. In the first half of 1949, the dollar value of shipments is off 5% from the same period of 1948, and orders entered are down over 9%. The balance of the year depends largely upon general business conditions. The relative stability of the folding-box industry is again emphasized. E.S.

## FOREST FIRES

BROWN, A. A. Research in forest fire fighting. Pulp Paper Mag. Can. 50, no. 9: 128-32 (August, 1949).

The work of the U. S. Division of Fire Research can be classified as concerned with the behavior, control, and effects of fire, environmental control, and economics. Studies on fire behavior are devoted to the fundamental physics and chemistry of combustion to give a more complete understanding of what to expect of fire under varying conditions. This knowledge is now being utilized in the prescribed burning of slash in the Northwestern Douglas fir region and in parts of the Southern pine country. Much of the research and administrative study of fire control has consisted of the application of scientific methods to planning a fire organization and the provision for facilities to meet specific standards. The work includes fire prevention and detection, the design and planning of fire organization, the development of fire equipment, and techniques and methods of fire suppression. The planning of fire-lookout systems, the development of fire-danger ratings, fire-danger meters, the fire rake, and the use of airplanes, specially designed bulldozers, and tank trucks in forest-fire control have represented significant contributions. The effects of fire, a rather neglected study in the past, includes the determination of fire damage and the special conditions under which certain benefits are produced. It is necessary to know how much damage may be done by fire in order that expenditures can be properly balanced. The appraisal of damage to commercial timber and young growth is fairly well established, but the task of analyzing and measuring damage to soil, watersheds, fish, game, recreation, and the local economy is just beginning. Little has been done on environmental control studies. Many possibilities in this field closely parallel the elimination or control of dangerous fuels as a fire prevention activity. Another phase is the possibility of local control of weather. A very important field is concerned with the economics of fire control measures, e.g., how much can be spent for fire prevention in comparison with what is spent for fire organization and equipment and how greatly the fire organization can be intensified in order to reduce losses by a predictable amount. R.R.

## FORESTS AND FORESTRY

ANON. A forest "pilot-plant" to set standard for Consolidated timber. Pulp & Paper 23, no. 10: 108, 110 (September, 1949).

The Consolidated Water Power & Paper Co. has set up a 2300-acre experimental industrial forest-management unit in northern Wisconsin which will be called the Gagen Forest Management Unit. Various cutting methods will be tested to determine whether their increased yields will justify the additional expense of management. Growth rate, reproduction, and salvage will be watched carefully. The Powell River Co. has established a 450-acre experimental and demonstration forest area near the Powell River, B.C., townsite, for long-term experiments on the various approaches to the problems of thinning, selective cutting, and reforestation in immature timber stands (*cf.* B.I.P.C. 19: 547). R.R.

BROMLEY, W. S. Progress in pulpwood production. Southern Pulp Paper Manuf. 12, no. 9: 30, 42 (September, 1949).

The author reviews briefly the progress in the four important phases of mechanized logging (felling and bucking; skidding; loading, hauling, and unloading; and integrated logging) and discusses the correlation of forestry practices with mechanized logging of pulpwood. Because of the scarcity of certain species in some regions and in the interest of perpetuating the forest resources, it is imperative that mill men learn to use more species of wood for pulping than they have in the past. E.S.

HEIMBURGER, C. Tree breeding research and its application. Pulp Paper Mag. Can. 50, no. 9: 118, 120 (August, 1949).

To illustrate the various phases of research in tree breeding and its application, the author considers the Quebec spruce, consisting of black, white, and red species. Black spruce is the most valuable native species in the boreal forest zone and is relatively easy to regenerate. Because it is possible that swamp spruce would tend to be represented by somewhat specialized swamp ecotypes which would show inferior growth on upland soils when compared with upland ecotypes, and vice versa, it would be important to use the different kinds of black spruce on their respective sites. White spruce, which grows on more fertile soil, often does not reproduce satisfactorily, suffers from competition with balsam fir and hardwoods, and is not satisfactory for forest management. A spruce is needed which would be as aggressive as balsam fir on these sites, could compete successfully with the hardwoods, and would have a faster growth rate. Red spruce, found in the mixed hardwoods zone, has seedlings which can live for years in shade without growing, but grow fairly well when released. This zone is quite accessible and intensive methods of management are more possible than farther north. Tree-breeding activities can be grouped into those which are designed to keep what is already at hand, to get whatever is possible from other climatic zones, and to create something which best suits the situation. These phases are discussed and suggestions regarding each are made. R.R.

## GROUNDWOOD PULP

SCHAFER, E. R., and HYTTINEN, AXEL. Groundwood pulping of five common northeastern farm woodland species. Paper Trade J. 129, no. 11: 37-9 (Sept. 15, 1949).

Groundwood pulping experiments were made on eastern white pine, yellow birch, red maple, American beech, and white ash, woods that grow extensively on farm woodlands in the Adirondacks and other northeastern areas. Pulps were made from each species, a naturally occurring mixture of the hardwoods, and a mixture of the pine and the hardwoods. The white pine was found to be suitable for making groundwood pulp with strength and brightness comparable to that of commercial softwood groundwood pulps. Of the hardwoods, red maple produced the strongest groundwood pulps and beech the weakest. In strength and fiber length the pulps made from these individual and mixed hardwoods were similar to those obtained from other hardwoods of similar density. Their best use would be as filler pulps in the softer, bulkier grades of paper. With the possible exception of the white ash, the hardwood pulps would need to be bleached before they could be used in appreciable quantities in white papers. The strength and brightness of the pulps made from the mixture of pine and hardwoods indicated that groundwood suitable for newsprint might be made by grinding mixtures containing up to about 35% of hardwoods by volume. 2 tables. E.S.

## GUAR

HAUG, ARTHUR J. Conversion of purified guar mannogalactan mucilage for tub-sized adhesive. Tappi 32, no. 9: 410-13 (September, 1949).

Conversions of the purified guar mucilage by oxidation in the presence of borax with sodium hydroxide at a pH of 11 produce adhesives which are useful as tub-sizing materials. Only a small amount of oxidant (approximately 5%) is necessary to degrade the guar polymer to produce a product of suitable viscosity. The folding endurance and bursting strength of a rag sheet were increased to 187 and 46%, respectively. 5 tables, 2 figures, and 9 references. E.S.

## GUMS AND RESINS

BROWN, F., HIRST, E. L., and JONES, J. K. N. Cholla gum. J. Chem. Soc.: 1761-6 (July, 1949).

Cholla gum, an exudate of the cactus, *Opuntia fulgida,* has been shown to consist of L-arabinose (6 parts), D-xylose (2 parts), L-rhamnose (trace), D-galactose (3 parts), and D-galacturonic acid (1 part) in the approximate proportions indicated. Hydrolysis of the methylated derivative of cholla gum yields 2,3,5-trimethyl L-arabinose (4 parts), 2,3,4-trimethyl D-xylose (2 parts), 2,3-dimethyl L-arabinose (1 part), 2,4-dimethyl D-galactose (3 parts), L-arabinose (1 part), and 2-methyl D-galacturonic acid (1 part). The L-arabinose residues are present in the furanose form, and the remainder of the sugars are in the pyranose form. Cholla gum, therefore, resembles other plant gums in many features of its architecture, the essential difference being that its acidity is caused by D-galacturonic acid instead of D-glucuronic acid. E.S.

BROWN, F., HIRST, E. L., and JONES, J. K. N. The constitution of egg plum gum. Part III. The hydrolysis products obtained from the methylated gum. J. Chem. Soc.: 1757-61 (July, 1949); *cf.* B.I.P.C. 18: 593.

Methylated egg plum gum has been hydrolyzed and the following sugars identified among the products of hydrolysis: (*a*) 2,3,4-trimethyl D-xylose, (*b*) 2,3,5-trimethyl, 2,5-dimethyl, and 2-methyl L-arabinose, (*c*) 2,4,6-trimethyl and 2,4-dimethyl D-galactose, and (*d*) 2,3-dimethyl D-glucuronic acid. The bearing of these results on the constitution of the gum is discussed. E.S.

JONES, J. K. N., and SMITH, F. Plant gums and mucilages. Advances in Carbohydrate Chem. 4: 243-91 (1949).

The development of the present state of knowledge of plant gums and mucilages is reviewed. 10 tables, 75 structural formulas, and 167 references. E.S.

WHITE, A. R. Resins in coniferous woods. Can. Pulp Paper Ind. [formerly Western Pulp and Paper] 2, no. 9: 12 (September, 1949); Pulp Paper Mag. Can. 50, no. 11: 166-7 (October, 1949).

Resins consist of a mixture of nonnitrogenous bodies dissolved in oil of turpentine to form a fluid mass which solidifies in air with the absorption of oxygen and the loss of the turpentine oil. The original clear liquid produced on the wounds of pine, balsam, spruce, and larch is called balsam or turpentine; the solid distillation product is colophonium or resin, in the narrower sense. Wounds in woods rich in resin seldom decay; resin-poor woods are regularly infected with rot fungi. The method by which resin is

forced out of the tree is described. It is likely that at least 50% of the resin found in pine pulpwood when it reaches the mill is produced after the tree has been cut down; cells are still reasonably active seven months after felling. When chemicals of very high toxicity are used to kill the tree, resin is entirely absent from the girdle and cannot be found on the sapwood after peeling. It would seem that this girdling and chemical treatment could be advantageously used to curtail resin production in pine pulpwood, which would be particularly valuable in the manufacture of sulfite pulp. When the treatment is applied for rapid bark removal, dehydration, and the prevention of fungus attack, the curtailment of resin content would entail no extra cost. R.R.

## HISTORY

DAVIDSON, PAUL B. Any old rags to sell? Sci. Monthly 69, no. 4: 254-61 (October, 1949).

The author gives a brief history of the development of the paper industry and considers the need for a conservation program (including the use of waste materials), the difficulty involved in using present-day cotton rags which often contain synthetic materials, papermaking, and some of its theoretical aspects. He also mentions various products which have arisen from the paper industry. R.R.

DONNELLY, FLORENCE. Pioneer paper mill of the West. Paper Maker [U. S.] 18, no. 2: 14-19 (September, 1949).

A biographical sketch of Samuel Penfield Taylor, builder of the first paper mill west of the Mississippi, and a history of the mill are given. The mill, located in Marin County, Calif., on what is now called Papermill Creek, was operating by November, 1856. Its business increased so rapidly that a much larger mill was built in 1883. After Taylor's death, his sons continued to operate and improve the property. Following the financial panic of 1893, it was taken over by Alexander Montgomery, but was never operated again. In 1916 it was destroyed by fire. The land on which it stood is now a state park. R.R.

KEIM, K. The paper machine 150 years old. Wochbl. Papierfabr. 77, no. 1: 3-9; no. 4: 95-7; no. 7: 211-14 (January, April, July 15, 1949). [In German]

This is a historical review of the development of the paper machine since its invention by Robert in 1799; additions and improvements of the individual sections are discussed in chronological order. The advances in the 20th century were characterized by the development of high-speed newsprint machines, and data on the "widest" and "fastest" machines for the different periods are given. Fine-paper machines and similar machines for medium speeds and Yankee machines and their modifications are mentioned. Brief reference is made to the construction of board machines, multivat cylinder machines, and combined Fourdrinier and cylinder machines. The influence of the invention of rosin sizing by Illig in 1806 and the use of new papermaking raw materials, in addition to rags (groundwood, soda, sulfite, and sulfate pulps, straw, esparto, and waste paper) on the developments and trends in the paper industry are briefly outlined. E.S.

## HUMIDITY

CARR, D. S., and HARRIS, B. L. Solutions for maintaining constant relative humidity. Ind. Eng. Chem. 41, no. 9: 2014-15 (September, 1949).

The aqueous tensions maintained by 12 saturated aqueous salt solutions in

an enclosed space from room temperature to 90° C. are given and the relative humidities calculated therefrom. The salts include the halides of potassium and sodium, the nitrate, nitrite, chromate, and dichromate of sodium, and chromic oxide. The data were obtained by a static method using a modification of the isoteniscope of Smith and Menzies. 10 references. E.S.

## INSTRUMENTATION

MURPHY, EUGENE A. Centralized instrumentation highlights multistage pulp bleach plants. Southern Pulp Paper Manuf. 12, no. 9: 48, 50, 52 (September, 1949).

Because bleach plants vary widely both with regard to the number of stages used and the types of process equipment employed, it is impractical to design a single complete system of instrumentation which will fulfill the requirements of all bleach plants. The average multistage bleach plant employs over 50 instruments whose carefully engineered integration will produce satisfactory results. It is in the bleach plant possibly more than in any other section of the mill, that individually designed instrumentation will provide the only satisfactory solution to a complex measurement and control problem. An outline of the partial instrumentation of a six-stage bleach plant is given and the basic instruments are described, including temperature, liquid level, and flow measurement; pH control; stock metering; and console-type and centrally located master-control cubicles. 5 figures. E.S.

## INTERIOR PACKING

SWENSON, S. L. Practical cushioning for efficiency. Am. Paper Merchant 46, no. 9: 26-7 (September, 1949); Packaging Parade 17, no. 200: 84, 94 (September, 1949); Am. Management Assoc., Packaging series no. 25: 3-9; discussion: 9-10 (1948).

The best package is one that will bring a product to its destination at the lowest comprehensive cost, which includes such indirect items as good will, reputation with customers, etc. The amount of correct cushioning thickness for adequate protection against a known shock load can be determined quite accurately if the gravity factor and maximum shock load which might be imposed on the product are known. Bracing is a method of interior packing designed to prevent the movement of the contents of a container and to distribute the weight to all of its faces. Cushioning materials are used with wood bracing, metal strapping, or corrugated fiberboard forms. The cushion may be excelsior, corrugated fiberboard, macerated newsprint pads, hair felt, wood-fiber felts, creped cellulose wadding, etc. Blocking is a method of wrapping irregularly shaped objects with soft resilient cushioning materials. The resulting package is fairly regular in shape, excessive stresses are avoided at projecting points, and any shock is distributed more evenly throughout the article. Soft conformable materials are utilized, such as cotton, creped cellulose wadding, and wood-fiber felts. Flotation protects the article by wrapping it in thick cushioning material so that it is literally suspended within the shipping package. The more resilient the cushion, the better is its performance. Creped cellulose wadding, wood-fiber felt, and cotton, usually 0.5-3 inches thick, make effective flotation packs. For finish protection, relatively thin cushioning materials such as glazed and waxed kraft papers, wood-fiber felts, creped cellulose wadding, and cotton are satisfactory. The correctly applied finish protector is tightly affixed to the merchandise. Special functions which are very important in some packaging applications are absorption and insulation. The objectives of an absorption pack are adequate protective cushioning against shock plus rapid and thorough absorption of liquid in case of breakage or closure leakage. Satisfactory absorption packs can be made from creped cellulose wadding, ab-

sorbent cotton, and sawdust. Most of the commercial cushioning materials are fairly good insulators and the selection of the cushion is frequently based on other characteristics such as low weight, flexibility, cleanliness, etc. R.R.

## LANTERN SLIDES

BONNELL, L. S. Preparation of effective lantern slides. Chem. Eng. News 27, no. 37: 2600-6 (Sept. 12, 1949).

Simple comprehensive methods for preparing effective slide copy are described to insure required legibility standards and rapid understanding of the contents. Choice of subject matter, dimension and lettering specifications, typewritten copy for tabular slides, choice of type of slide, slides of graphs (hand-lettered, typewritten, and bar graphs), process flow plans, maps, and legibility tests and their derivation are discussed. 10 figures and 7 references. E.S.

## LIBRARIES

KILLEFFER, D. H. A great American chemical library. Chem. Eng. News 27, no. 33: 2322-6 (Aug. 15, 1949).

A brief description of the history and facilities of the library of the Chemists' Club in New York is given. A list of the periodicals taken by the library is included. E.S.

## LIGNIN

CLARK, T. F. Saccharification lignin concentrates in phenolics. Modern Plastics 27, no. 1: 119, 168-9 (September, 1949).

In all processes for the saccharification of lignocellulose, lignin or lignin concentrate is formed as a by-product. In an effort to find a practical use for such substances, the author made a study of by-product corncob lignin concentrates as a component in phenolic resin condensations and as a filler in thermosetting phenolic compounds. When used as a component of phenolic resins, the material promoted water resistance in the molding compounds, but otherwise seemed to act as an inert filler. Compounds containing equal amounts of the concentrates and a variety of experimental and commercial resins were prepared and tested by conventional methods. The final molded products had a good appearance but were relatively brittle and weak; the flexural values were 7000 p.s.i. in comparison with a minimum specification of 9000 p.s.i. for general purpose phenolics. The results were similar to those obtained on wood saccharification lignin by other investigators. The outstanding property of the molded compounds was their resistance to absorption in boiling water. 9 references. R.R.

DAWSON, T. R. Lignin. J. Rubber Research 18, no. 1: 1-11 (January, 1949); J. Textile Inst. 40, no. 5: A209 (May, 1949). [Abstract only available]

A brief account is given of the sources, production, properties, and probable molecular structure of lignin. The applications of lignin in adhesives, plastics, and particularly as a reinforcing agent and antioxidant in rubber are reviewed. Experimental data are cited and it is shown that lignin, unlike the usual reinforcing agents, gives best results when coprecipitated with rubber from latex. E.S.

HARRIS, ELWIN E., SAEMAN, JEROME F., and BERGSTROM, CLARENCE B. Lignin hydrogenation products. Ind. Eng. Chem. 41, no. 9: 2063-7 (September, 1949).

Two samples of lignin recovered from soda-process black liquors were hydrogenated in continuous equipment, one at about 325° C. with copper

chromite catalyst, and the other at about 400° C. with tin sulfide and iodoform. In both cases about 70% of the lignin was converted into volatile products, including gas, water, hydrocarbons, methyl alcohol, ketones, cyclic alcohols, and phenolic compounds. Hydrogenation at 325°C. produced 14% water, 8% methanol, 8% tar acids, 13.3% oxygen compounds, 21.8% unsaturated and 2% saturated hydrocarbons, 4% gas, and 28% heavy oil. Catechols were removed from tar acids with lead acetate and appeared in about equal amounts as catechol, 4-methylcatechol, 4-ethylcatechol, and 4-propylcatechol; they represented 12% of the tar acids. The noncatechol fraction contained phenol, guaiacol, *p*-cresol, 4-alkyl-2-methoxyphenols, and xylenols besides several unidentified phenolic substances. Neutral oxygen compounds were removed from the neutral oils remaining from alkaline extraction by treatment with anhydrous magnesium chloride. The oxygen compound was recovered by decomposing the resulting magnesium chloride complex with water. The fractions represent 30 to 40% of the neutral oils or 10 to 15% of the lignin. Acetone, methyl ethyl ketone, cyclopentanone, and other ketones were among the products isolated. The higher-temperature hydrogenation produced similar products but in different amounts. 16 references. E.S.

## MACHINERY

COUTURE, J. W. Dilts engineering & research from 1850 to 2050. Paper Mill News 72, no. 38: 67, 92 (Sept. 17, 1949).

A resume is given of the accomplishments of Dilts Machine Works, Inc., and the Dilts Machine Works, Division of the Black Clawson Co., including the development of the high-speed beater, the first full-scale pilot plant and testing laboratory for use in solving customers' technical problems, the Classifiner, Hydrafiner, and Hydrapulper. Improvements in sales, engineering, manufacturing, and development engineering will continue in the future. R.R.

CROCKER, JOHN W. Retrospect of engineering. Paper Mill News 72, no. 38: 43-4, 46, 48 (Sept. 17, 1949).

The author considers the accomplishments during the past year of the engineering department of The Sandy Hill Iron & Brass Works in technical research, developmental engineering, and design. He emphasizes the need for co-operation between the technical staffs of paper mills and equipment manufacturers for the greatest future progress. R.R.

DE PAN, R. F. The paper machinery manufacturer contributes to progress. Paper Mill News 72, no. 38: 52, 54 (Sept. 17, 1949).

The author points out the services engineers of the Downingtown Manufacturing Co. are giving to paper mills. In the company's pilot plant tests are being made on a new stock pulper, broke pulper, refiner, strain-gage control loading, cutters, nondeflecting press rolls, a laboratory sheet-forming machine, etc. Experimental work is also conducted at the University of Maine. R.R.

## MACHINERY—BEATERS

DRAUTZ, E. G. A new high-output overthrow beater with excess pressure (Drautz system). Wochbl. Papierfabr. 77, no. 8: 235 (July 31, 1949). [In German]

A new type of hollander construction is described in which the pulp is thrown by the beater roll into a hood narrowing into a flat conduit which causes an intimate mixing of the pulp. 1 diagram. E.S.

## MACHINERY—BELTING

COOK, R. E. Inventive genius lowers belt cost of cone pulley. Paper Trade J. 129, no. 12: 90-1 (Sept. 22, 1949).

A special belt for taper cone pulley operation is constructed from the central or backbone portion of the hide; the plies are cemented together and arranged so that the backbone lines of the hide are parallel to the greatest stress. This construction spreads the pulling point somewhat across the width of the belt, providing a more constant, regular speed, more power for a given belt width, far less tension and, consequently, fewer stoppages for take-ups. The belt will transmit more power under a given tension, run straighter, eliminate lateral shifting on the pulleys, and resist edge wear against a belt shifter; it will not curl at the edges, its inner plies have a much longer operating life, and stretch is reduced to a minimum. The patent drawings are reproduced. R.R.

## MACHINERY—CONVERTING MACHINERY

CANADA ILLINOIS TOOLS LIMITED. New slitter and scorer assembly. Fibre Container 34, no. 8: 189-90 (August, 1949).

An interchangeable slitter and scorer assembly for the manufacture of corrugated boxes is described, which is claimed to give twelve times longer service than the conventional heads and to reduce the setup time to three or four minutes. Four figures, depicting the individual sections, the complete assembly, and the method of holding the sections by a wedge and locking ring, are included. E.S.

## MACHINERY—CONVEYORS

ANON. Port Alberni conveyor can carry 8000 cubic feet of chips per hour. Can. Pulp Paper Ind. [formerly Western Pulp and Paper] 2, no. 9: 9 (September, 1949).

An illustrated description is given of the chip conveyor at the Bloedel, Stewart & Welch plant at Port Alberni, carrying chips from the woodroom to the storage bins. The 7000-foot, 24-inch, 4-ply belt made of rubber-covered duck has given no trouble since its installation two years ago. The capacity of the belt, 8000 cu. ft./hr., represents an increase of over 30% above the usual figure for this size, largely the result of the 45° idlers. The effective speed of the conveyor is 300 ft./min. A 5-ply, 42-inch belt in two 700-foot sections carries chips from the silos to the digesters. R.R.

## MACHINERY—ELECTRIC EQUIPMENT

BAKER, R. R. Recent developments in motor drives. Paper Mill News 72, no. 38: 38, 40 (Sept. 17, 1949).

Among the new developments are package units, with control and power-conversion equipment assembled and mounted in a suitable enclosure, which have lower installation costs than the conventional type; synchronous motors, combining proper torque characteristics with suitable automatic control; squirrel-cage induction motors with enclosures, winding insulation, and mountings to permit their use throughout the mill; sectional drives with electronic speed regulators and one of several types of generators; the Rototrol rotating regulator, a regulating generator; an adjustable-speed d.c. supercalender drive; suitable motor-drive equipment for hydraulic log barkers; and synchronous motor drives for full-log chippers. R.R.

BERGER, R. C. Process control co-ordinated with electrical distribution. Paper Ind. 31, no. 6: 680-3 (September, 1949); *cf.* B.I.P.C. 19: 689.

The new electrical distribution system installed by the Fairfield Paper and Container Co., Baltimore, Ohio, is described. The installation is not only a modernization of the old distribution system, but co-ordinates completely the electrical distribution with the process control operations of the new mill. Approximately 85% of the power consumed by the mill is purchased from the local utility; the balance is generated by a steam-engine generator. A schematic diagram shows in detail the new primary and secondary distribution system now in operation; the economic, safety, maintenance, and operating advantages of centralized control are emphasized. E.S.

CALVERT, FRANCIS V. Electric cables for the pulp and paper industry. Tappi 32, no. 9: 413-16; discussion: 416-17 (September, 1949).

To select the proper electrical cables to give the maximum in safe, economical distribution of large blocks of power, the following points should be considered: voltage levels, special conditions, developments in cables, and arrangement of feeders. Based on installed cost, a 4160-volt system is more economical than a 13,800-volt system for mill capacities up to about 10,000 kva. In the range 10,000-20,000 they are comparable; above 20,000 the latter is the logical selection. Standard cables can be obtained for the various system voltages. Generally a radial distribution system is the most economical and affords sufficient system reliability for both low- and high-voltage feeders. The low-voltage svstem is more likely to require other variations. Special conditions which must be considered involve corrosion and moisture, heating of cables, voltage drop, and short-circuit capacity of cables. Recommendations for proper cable selection are given. 3 tables. E.S.

RELIANCE ELECTRIC & ENGINEERING CO. Gearmotor and corrosion-resisting a-c. motor. Paper Mill News 72, no. 38: 62-3 (Sept. 17, 1949).

An illustrated description is given of the corrosion-resistant, explosion-proof a.c. motor and the gearmotor available in single, double, and triple reductions for a.c. or d.c. application, which were developed in 1948. R.R.

THOMPSON, R. C. High voltage motor control. Paper Mill News 72, no. 38: 60, 88 (Sept. 17, 1949).

High interrupting-capacity fuse-control systems provide an adequate and inexpensive method of protecting high-voltage motor installations by interrupting fault currents before damage can result. The source of fault currents, their determination, co-ordination of control, and fuse sizes are discussed. R.R.

## MACHINERY—PAPER MACHINE

ANON. Several paper machines recently built by "Sandy Hill." Paper Trade J. 129, no. 13: 29 (Sept. 29, 1949).

Brief descriptions are given of a hardboard-forming machine built for Fibracel in Mexico, a commercial-size laboratory machine for the Forest Research Institute at Dehra Dun, India, a general-purpose machine for Fabrica Nacional de Papel, Uruguay, and a tissue machine for an Argentine mill, and improvements at the Dresden Paper Mills, Dresden, Ohio, all by The Sandy Hill Iron & Brass Works, Hudson Falls, N.Y. R.R.

KOLLER, ALFRED. The paper machine and its recent innovations. Textil-Rundschau 4, no. 8: 288-94 (August, 1949). [In German]

Following a brief description of Mr. Nibroc, the new Yankee machine of the Brown Co. (*cf.* B.I.P.C. 18: 852), recent developments and improvements in the construction of paper machines are discussed. These include high-pressure inlets, pumps, grooved table rolls, suction boxes and rolls, savealls, suction couch rolls, the Toledo weight control of the paper web, Mycocide for desliming felts, jordan-type felt conditioners, vibrating doctors, driers and condensate removers, Harland drives, electric drives with fluid couplings, ventilation of paper-machine hoods, the Langston DA slitter, metallizing of machine parts, and noise abatement in paper-machine rooms by insulating the walls and ceilings with Acousti-Celotex boards. E.S.

## MACHINERY—PIPING

GALLAY, W. Viscosity of fibrous suspensions. Tappi 32, no. 9: 53-4A, 56A, 58A; discussion: 60A, 62A, 64A, 66A, 68A, 70A, 72A, 74A, 76A, 78-9A (September, 1949).

Following a brief review of some basic generalities governing the flow of fluids, the relationships of the various factors involved in the viscosity and flow of pulp suspensions (axial ratio of pulp fibers, size and degree of dispersity in the size of fibers, their flexibility and plasticity, specific surface, concentration, rate of shear, etc.) are discussed, with emphasis on the complicated nature of the problem. Very little fundamental information is available on this subject and it does not appear feasible at this stage of development to set up useful generalizations derived on a theoretical basis. Empirical relationships, obtained under carefully controlled conditions, should be derived for a number of pulp systems, and such data confirmed or related to mill data. It is probable that useful engineering data would be obtained in a careful systematic investigation of this nature (*cf.* B.I.P.C. 19: 782). The paper is intended as an introduction to a discussion on the flow of paper stock in pipes, in which representatives of leading pump manufacturers participated. E.S.

PETERSON, C. W. Friction loss in pipes carrying pulp stock. Svensk Papperstidn. 52, no. 15: 371-3 (Aug. 15, 1949). [In English; German and Swedish summaries]

The author calculated the friction losses in pipes carrying pulp stock under different conditions by substituting data by Brecht and Heller (*cf.* B.I.P.C. 6: 209) in the Fanning friction equation (*cf.* Perry, Chemical engineers' handbook, 2d ed., p. 805-6) and modifying the Reynolds number by using a pulp consistency factor in place of the viscosity term. The modified Reynolds number was found to be independent of the diameter of the pipe. The curves based on the substitution of Brecht and Heller's data followed the form of the Fanning friction chart for normal fluids, showing a straight line for laminar flow and flat curves for different pipe surfaces in the region of turbulent flow. In addition, the critical Reynolds number occurs at approximately the same value of the friction factor in each case; it is approximately the same for long-fibered sulfite and eucalyptus sulfate pulps (23,000). The curves for laminar flow of both pulps are somewhat steeper than those for normal fluids. By means of the modified Reynolds number it is a simple matter to calculate the friction losses for every pulp consistency, rate of flow, and pipe diameter. 1 chart and 3 references. E.S.

## MACHINERY—PRESSES

ORB. Facts concerning wet presses. Wochbl. Papierfabr. 77, no. 7: 214-15 (July 15, 1949). [In German]

The rate of dewatering in the wet presses is influenced by the speed of the paper machine and the nip pressure of the presses, the type of wet felts used, and the quality of the press rolls, particularly the hardness of the

rubber-roll coverings. The dewatering effect of the presses decreases at higher machine speeds. The dewatering efficiency of the wet felts depends upon their weight, thickness, and density. The more permeable the felt, the higher is the dewatering effect of the presses. However, the felt quality to be used depends upon the character of the paper which is produced. The tension of the felt in the machine may also exert an influence upon its permeability. The wet presses work with increasing nip pressure and hardness of the rubber-roll coverings from first to third press. The harder the roll, the more water will be removed in the presses; the effect is greater when the hard roll is on top. The pressing effect decreases with increasing roll diameter. Felt consumption on the other hand is lower, the softer the rubber-roll covering. The crowning of the rolls is of utmost importance and must be determined for each case; it should be checked regularly at definite intervals and the values be inserted in a curve, which gives a clear picture of the roll's condition. A record should be kept of each roll and all changes should be noted. E.S.

SKARK, L. The kinetics of pressure dewatering wood-fiber pulps. Holzforschung. 3, no. 3: 76-85 (1949). [In German]

Following a general discussion of the process of pressing wood-fiber pulps, an experimental investigation of the kinetic relationship between pressure velocity and dewatering is considered. No general formulation is made, and only experimental results are discussed. Proceeding from the considerations of Gurnham and Masson (*cf.* B.I.P.C. 17: 236), the author does not examine the relationship of compressibility to progressive pressure, but analyzes the dewatering relationship and compares it with pressure velocity. The maximum dewatering difference is found suitable as a measure of dewatering characteristics; it is expressed by the inflection tangent corresponding to the differential quotient, $\frac{\Delta E}{\Delta Z} W = tg\alpha_w$, and corresponds to the general formula, $tg\alpha_w = p \cdot k$, in which $p$ represents the increase in pressure per second. The constant $k$ depends on the test quantity, that is, the weight of pulp per unit area. In the case of pressure dewatering at elevated temperatures, this relationship is not valid, but, in the range of small pressure velocities, is represented approximately by the root function, $tg\alpha'_w = \sqrt[n]{p \cdot k'}$ At high pressure velocities the influence of temperature can be neglected. In the extreme case of pressure velocity, for example, through impact, $tg\alpha_w$ attains half the value of the moisture content of the pulp sample. The constant which is calculated from the relationship, $\frac{tg\alpha_w}{p} = k$, is proportional to the water content of the sample, and permits determination of the water content of a fleece, as applied in the production of hardboard. Uniformity of the pressing operation can be controlled by comparison of maximum dewatering rate with pressure velocity and pressing time. 3 tables, 12 figures, and 15 references. E.G.S.

## MACHINERY—PRINTING MACHINE

MIEHLE PRINTING PRESS AND MANUFACTURING COMPANY. New sheet-fed rotary letter press. Am. Boxmaker 38, no. 9: 32 (September, 1949).

The new sheet-fed rotary press prints directly from curved relief plates but is basically similar in design to the Miehle 61 and 76 offset presses. It is of unit construction, which allows for the addition or removal of color units, makes it possible to pack the impression cylinders and make-ready in

much the same way as on a flat-bed cylinder press, and permits the individual plate cylinders to be declutched and plated up simultaneously. The Dexter feeder used is the same as that on all larger postwar Miehle equipment. Sheets are preregistered and one is brought into register position before the preceding sheet has moved off the feedboard. Accurate transfer between printing units is assured by a series of three transfer drums, each with one set of grippers. The press will be manufactured in two sizes with running speeds up to 6000 sheets/hr. R.R.

### MACHINERY—STOCK-PROPORTIONING METERS

TRIMBEY MACHINE WORKS, *Glens Falls, N.Y.* Continuous proportioning of paper pulp saves power, assures uniformity. Chem. Processing Preview 12, no. 9: 14-15 (September, 1949).

A continuous and automatic stock proportioning system in a book paper mill is described, which provides a steady flow of sulfite, soda, deinked pulp, and broke, all in slush form, as well as color, size, clay, etc., to the paper machine. The unit is driven by a 1½ h.p. motor and has four large meters for each of the pulps and smaller meters for the other ingredients. The consistency of each pulp as it is pumped to the respective meter compartment is controlled by a consistency regulator and the quantity by a direct-acting float valve. Once the speed control is set, a regular attendant is not required. E.S.

### MARKET RESEARCH

ANON. Columbus experiment 5 years after. Modern Packaging 23, no. 1: 71-5 (September, 1949); *cf.* B.I.P.C. 16: 7-8.

The original prepackaging operation of The Great Atlantic and Pacific Tea Co., called the "Columbus experiment," employed four people, who did the packaging by hand. Consumer acceptance was immediate and now necessitates the work of 30 people, three automatic wrapping machines, an apple sorting and packing machine, and air-cooled trucks. The present operation is characterized by an attempt at temperature control from the time the produce reaches the warehouse until its purchase by the consumer. Regular moisture-proof heat-sealing cellophane is still used in all prepackaging operations; condensation inside the package has never been a serious problem. A three-day salability limit has been in effect since the beginning of the experiment. There have been few changes in the kinds of produce prepackaged; packaging techniques and methods are much the same as those originally used, except that they now more closely resemble an assembly line. The size of packages varies with the price of the article; the higher the price, the smaller the package. The choice of the packaging site is partly dependent on the commodity, supply, and the distance between producer and market. R.R.

### MATERIALS HANDLING

CLARK EQUIPMENT COMPANY. *Industrial Truck Division. Battle Creek, Mich.* Unload bags of chemicals onto paper sheets, instead of skids, for pick-up by truck. Chem. Processing Preview 12, no. 9: 6-7, 9 (September, 1949).

Brief reference is made to the improvements in the handling of chemicals in paper bags by the use of a special Pul-Pac truck and paper load-carrier sheets in the place of skids. Cars are unloaded by this method in half the time previously required, manpower is saved, damage to bags is negligible, and storage space much better utilized, because the bags can be tiered 20 high, as compared with the former 10 high, when stacked by a crew. E.S.

## MICROBIOLOGICAL TESTING

APPLING, JOHN W., BUCKMAN, STANLEY J., and CASH, CONAN D. Determination of the mold resistance of paper and paperboard. Tappi 32, no. 9: 427-9 (September, 1949).

Brief reference is made to the inadequacies of existing methods for the determination of mold resistance of paper and paperboard, and a procedure developed in the Buckman Laboratories (Bulab method) is described, which is claimed to simulate service conditions better, without becoming increasingly complex and unwieldy. Four different test organisms (*Chaetomium globosum, Penicillium sp., Aspergillus versicolor,* and *Aspergillus niger*) are listed and the use of at least two of them is recommended. Visual inspection of the inoculated specimens at the end of seven and 14 days will give the degree of mold resistance; tests based on a 21-day inoculation period showed no increase in growth over that of the 14-day period. 1 figure and 4 references. E.S.

## MILL CONTROL

ANON. Laboratories of the Associated Paper Mills Ltd. World's Paper Trade Rev. 132, no. 3: Tech. Sup. 60-4 (July 21, 1949).

The laboratory activities of the six individual mills belonging to the Associated Paper Mills Ltd. in England and Scotland are outlined. Each mill has its own laboratory, resident chemist and, in most cases, trained staff. One of these units, the Cooke and Nuttall mill at Horwich, houses the Central Laboratories with a library. Brief illustrated descriptions of the different laboratory facilities are given. E.S.

## MILL MANAGEMENT

BRUNNBERG, ARTHUR. The organization of pulp and paper mills. Svensk Papperstidn. 52, no. 14: 347-54 (July 31, 1949). [In Swedish]

The efficient organization of certain auxiliary departments in a pulp and paper mill is discussed, including the repair and maintenance department, the handling of raw materials and supplies, the keeping of records of all supplies, and cost accounting. Top management should not be involved in the details of these functions. E.S.

CASS, C. E. Coordinated engineering services develop improvements in productive efficiency. Paper Mill News 72, no. 38: 36-7 (Sept. 17, 1949).

To illustrate the results achieved by the co-ordination of specialized staff services and co-operation between these services and operating personnel, the author reports on the development of the new converting plant of Marathon Corporation, which replaces widely separated converting plants and a warehouse in the same city. The project began as a survey to determine the possibilities of increasing efficiency within the existing arrangement through improvements in plant layout and/or materials handling methods. Staff plant layout, materials handling, staff and line levels of manufacturing, personnel, operating, buildings and construction, power and utilities engineering, mechanical engineering, purchasing, industrial engineering, and accounting departments were all consulted at various times during the program. By comparing the flow patterns of the old and new layout, it can be seen that a major saving is effected as a result of improved work flow and reduced handling. R.R.

GRIFFENHAGEN, E. O. What management engineering can mean to business in a buyers' market. Paper Mill News 72, no. 38: 30, 32, 80 (Sept. 17, 1949).

Typical consulting management projects are briefly described to illustrate the type of work done and results obtainable. One of the good methods of determining the effectiveness of business operations is to have an independent appraisal of a business. The points covered, advantages, reasons for, and the procedure followed in making such an audit are considered. R.R.

## MUCILAGE

LAIDLAW, R. A., and PERCIVAL, E. G. V. Studies on seed mucilages. Part III. Examination of a polysaccharide extracted from the seeds of *Plantoga ovata* Forsk. J. Chem. Soc.: 1600-7 (June, 1949).

Extraction of the seeds with cold water yielded a polysaccharide (PI) of equivalent weight of about 700, giving on analysis uronic anhydride (20%), pentosan (52%), and methylpentosan (18%). Further extraction with hot water gave PII, equivalent weight about 4000, containing about 3% of uronic anhydride. Hydrolysis of PI gave D-xylose (about 46%), L-arabinose (about 7%), and an aldobiuronic acid (40%) shown to be 2-D-galacturonosido-L-rhamnose, and an insoluble residue (2%). From PII, L-arabinose (about 14%) and D-xylose (about 80%) were isolated, along with an insoluble residue (3%). Acetylation, followed by deacetylation and methylation of PI and subsequent fractional precipitation, gave materials *A* (82%) and *B* (18%). Methanolysis of *A* yielded trimethyl methyl-D-xylopyranosides (6 parts), trimethyl methyl-L-arabofuranosides (1 part), 2,4-dimethyl methyl-D-xylopyranosides (1 part), 3-methyl methyl-D-xylopyranosides (4 parts), 2-methyl methyl-D-xylopyranosides (1 part), and methyl-D-xylopyranosides (2 parts). *B* gave similar fractions, except that double the proportion of 2,4-dimethyl methyl-D-xylosides was present at the expense of monomethyl methyl-D-xylosides. The aldobiuronic acid is probably a component of a polyuronide associated with a neutral polysaccharide rather than an integral part of a single acidic polysaccharide. E.S.

PERCIVAL, E. G. V., and WILLOX, I. C. Studies on seed mucilages. Part IV. The seed mucilage of *Plantago lanceolata*. J. Chem. Soc.: 1608-12 (June, 1949).

Methylated rib grass-seed mucilage prepared from the acetate (*cf.* J. Chem. Soc.: 1501-6 [1940]) gave, on methanolysis, trimethyl methyl-D-xylopyranosides (37%), tetramethyl methylgalactopyranosides (2.4%), 2,4-dimethyl methyl-D-xylosides (16%), 2,3-dimethyl methyl-D-xylosides (16%), 2,4,6-trimethyl methyl-D-galactosides (1.2%), 2-methyl methyl-D-xylosides (8%), 3-methyl methyl-D-xylosides (about 5%), and methyl-D-xylosides (7%). The presence of 3,4-dimethyl xylose derivatives previously claimed could not be substantiated. The aldobiuronic acid present in the portion of the mucilage resistant to hydrolysis appeared to be a mixture; the acidic component was identified as D-galacturonic acid. E.S.

## NEWSPRINT

AMERICAN NEWSPAPER PUBLISHERS ASSOCIATION. Newsprint roll loss and damage survey. Newsprint Service Bur. Bull. no. 380: 2 (Sept. 17, 1949).

In January, 1949, ANPA mailed a confidential roll newsprint loss-and-damage questionnaire to all daily newspaper publishers to ascertain the facts with respect to newsprint loss and damage. Data from the summarized analysis of the answers are given; the evaluation of these replies indicates that there is no basis for the Railroad Freight Claim Division's agents' allegation that the weight of the wrapper should be increased or that it is necessary to provide a specific rule in the Consolidated Freight Classification to govern loading and wrapping of newsprint. Recognizing that certain responsibilities also rest upon the newspaper publishing business, the ANPA Traffic Department made certain recommendations to the publishers and the Freight Claim Division agreed to make no changes until it was determined to what extent these recommendations will be actually adopted by the newspaper publishing business. E.S.

ANON. Newsprint situation in India; problems confronting domestic manufacture. World's Paper Trade Rev. 132, no. 10: 624, 627-8 (Sept. 8, 1949).

The story of the newsprint situation in India has been a tale of recurring crises ever since the war started; this was caused largely by the country's complete dependence on foreign countries for her supplies. There are very definite reasons why newsprint paper has not been manufactured in India up to the present time; paramount among the retarding factors has been the inability of the country to support a newsprint unit which must have a minimum output in the neighborhood of 20,000 tons per year to operate on a competitive basis. A further reason is the fact that adequate supplies of suitable raw materials for the production of mechanical pulps were not available at economic prices and in localities where the manufacture of newsprint could be undertaken. With the spread of literacy and rise in the standard of living, private efforts have been made to explore the possibilities of exploiting other woods, and as a result, a process has been developed by which newsprint can be made from trees growing in the Central Provinces. A joint stock company has been registered (*cf.* B.I.P.C. 19: 860). E.S.

VON BLOCK, B. W. The newsprint "gray" market in the United States. Pulp Paper Mag. Can. 50, no. 9: 70-3 (August, 1949).

The author reveals the methods by which newsprint grey-marketeers operated in the United States. Brokers without adequate operating capital who knew nothing about paper offered it for immediate delivery at high prices; the same lot was often sold by various brokers to several prospects, subject to prior sale; and sometimes nonavailable paper was sold in the hope that something would turn up and the order could be filled. The origin of the paper sold was carefully hidden and the quality was sometimes remote from that of newsprint; fire- and water-damaged paper was sold as perfect stock. In 1948, when the general belief was that the shortage would continue for some time, a few brokers sold short at prices below the going market, taking carefully written contracts for long-term commitments; some publishers are still receiving monthly shipments at $160-170/ton, f.o.b. shipping point. In mid-January prices fell rapidly and by February few buyers would take newsprint unless it was offered on a delivered price basis with the understanding that it would be delivered and inspected by the purchaser before payment. This year imported paper has glutted the market and quotations on standard sizes have dropped as low as $70/ton. R.R.

## PAPER—COATED

WARE, H. O. Casein in machine coating. Paper Trade J. 129, no. 10: 29 (Sept. 8, 1949); World's Paper Trade Rev. 132, no. 15: 956, 960 (Oct. 13, 1949).

Since the middle 1930's the application of casein in the high-solids machine-coating process has been retarded by its high cost because of food shortages and government support and by a lack of information on the requirements of the machine-coating application of casein. The first casein high-solids coating "colors" have been too viscous for use with machine-coating units and the utility of the casein-bonded machine-coated papers could not be measured when they were not produced. Better operability now seems a definite possibility, partly through an understanding of the rheological properties of coating mixes. R.R.

## PAPER—COATED (HOT-MELT)

ANON. The acid test. Dupont Mag. 43, no. 5: 28 (October-November, 1949).

Brief reference is made to the new Alathon polythene resins developed by Du Pont, their use as paper coatings, and the new possibilities they offer for packaging problems, where it has previously been impractical to use paper. Such coatings are ideal for containers of greasy or corrosive materials, low temperatures, and the maintenance of a specified moisture or dryness content. Illustrations depict the resistance of Alathon-coated paper to sulfuric acid; the sheet was not noticeably harmed after four days' exposure to one of the most corrosive chemicals, whereas uncoated paper was ruined in 15 minutes. E.S.

## PAPER—DEFECTS

SMITH, J. FERGUS. The elimination of two-sidedness. World's Paper Trade Rev. 132, no. 9: 596, 598, 660 (Sept. 1, 1949).

The author made a systematic study of the fundamental causes of the uneven distribution of loading and fine fibers throughout the thickness of a paper sheet, which is generally recognized as the main reason of two-sidedness. Analyses of numerous papers made on both slow and fast machines, including all the usual types of fine papers and newsprint, showed quite definitely that the two-sided effect on newsprint was distinctly greater than that on fine papers, judged not only by eye and appearance under the microscope, but by the percentage of ash on the top layer relative to that on the bottom layer. This indicated that speed was certainly a contributory factor; moreover, the evidence suggested that it was hardly possible to obtain a sheet of paper free from two-sidedness, even at very low speeds, especially colored papers made from pigmentary dyes, such as ultramarine. With regard to the effect of suction boxes, an experimental run without them showed just as much two-sidedness as with them, although there was an over-all reduction in color. In laboratory experiments on a modified British Standard Sheet Machine with different conditions of suction, vibration, etc., it was observed that the furnish losses never approached those experienced in the mill. Consistency determinations of white-water samples from the various table rolls, suction boxes, etc., under actual mill conditions brought to light the fact that the percentage of white-water solids did not decrease at the same rate as in the laboratory; instead of a uniform gradual decrease in consistency, toward the middle of the Fourdrinier wire, the decrease came to a halt and hardly changed until the suction boxes were reached. This could be traced to the action of the table rolls which, whenever the immature sheet rode over one of them, squeezed the water in the nip through the wire, lifting momentarily the whole sheet, flooding and loosening small fibers and loading material, this washing effect being repeated at every roll. Successful experiments for duplicating this effect in the laboratory are described and the various types of two-sidedness examined in the light of the above explanation. To prevent the water clinging to the underside of the wire and the roll from being

forced through the meshes of the wire, grooved rolls were found to offer a possible solution (British patent 518,123); however, the depth of the grooves is quite critical for slow, medium, and fast machines, particularly after the sheet has been formed; the grooves must then be just the correct size, decreasing as the sheet becomes drier. With the correct depth of groove for each roll, maximum benefit was derived; in addition to elimination of two-sidedness, losses through the wire were greatly reduced. E.S.

## PAPER AND PULP INDUSTRY

BETTENDORF, HARRY J. Wood pulp and pulpwood statistics. Fibre Containers 34, no. 8: 121-6 (August, 1949); *cf.* B.I.P.C. 19: 99.

The rise in pulpwood prices to a peak in the spring of 1948 was accompanied by the establishment by Scandinavian pulp producers of higher market levels than those of domestic and Canadian mills. European imports for 1948 thereupon dropped to a lower proportion of U. S. consumption than the relatively low 1947 level; a further reduction occurred in the first five months of 1949—imports were 93,033 tons compared with 311,945 tons for the first five months of 1948. At present, Scandinavian pulp sells at domestic levels on a delivered price basis. In July and August, 1948, pulp supplies began to meet and exceed demand, with the result that prices for all grades of pulp from all sources declined rather quickly. Further significant facts regarding the pulp situation are the considerable expansion of domestic pulp capacity, particularly for southern kraft, a greater reliance on domestic sources for supply, continued reliance on Canada, and greatly reduced reliance on Europe. The 1948 production increased substantially; imports and exports decreased. Production declined in the early part of 1949 and imports were 36% less than in the same period of 1948. Domestic cutting of pulpwood reached a new high of over 20 million cords in 1948; with imports, total available supplies reached a new high of 22.3 million cords. The new high consumption, 21.3 million cords, was below receipts, thus permitting a record high inventory of over 5.6 million cords at the end of 1948. Prices were about double the 1937-39 average, although they moderated somewhat during the latter part of 1948; the trend continued in 1949. Paperboard mills are now larger pulp producers than paper mills and are, as an industry, approaching a position where they will be almost self-contained as far as supplies are concerned. Numerous charts and tables are included. R.R.

INTERNATIONAL BROTHERHOOD OF PULP, SULPHITE AND PAPER MILL WORKERS. *Department of Education and Research, Montreal, Que.* The changing pattern of wants. Pulp Paper Mag. Can. 50, no. 9: 74-80 (August, 1949).

Comparative statistics are given for 1948 and 1949 to show the decreased demand for pulp and paper in general, and for newsprint, fine papers, board, and pulp. The number of freight cars loaded with pulp and paper in Canada during the last week in April, 1949, was over 11% less than for the similar 1948 period; during the last week in March, 1949, it was more than 16% less than in March, 1948. The drop in orders from the United States has been attributed to the business slump there, and from other countries, to the dollar shortage. The changing situation emphasizes the need for greater efficiency, particularly of labor. The effect of the Marshall plan in the Canadian industry, the increase in inventories, the trim loss resulting from the width of newsprint ordered, and the dependence of newsprint wages on the general economy are considered. A temporary sharp drop in newsprint orders is possible; a slight permanent drop in orders is inevitable when publishers' inventory stocks are sufficiently high. R.R.

SVENSKA HANDELSBANKEN'S QUARTERLY INDEX. Swedish wood pulp industry; a survey of the situation and prospects. World's Paper Trade Rev. 132, no. 10: 616, 618, 620, 656, 658 (Sept. 8, 1949); Paper-Maker (London) 118, no. 3: 166-8, 170 (September, 1949); Pulp Paper Mag. Can. 50, no. 11: 86-9 (October, 1949).

The two serious problems are discussed with which the Swedish pulp industry is confronted at the present time. The one is a long-range problem of production, the Swedish forest industries, particularly in the northern part of the country, having reached the production limit determined by the natural regrowth of the forests. The other is a marketing problem arising from the unfavorable development on the American pulp market during the past year. Present marketing difficulties, prospects of Swedish pulp exports to the United States, and the influence of the general trend of consumption and purchasing power throughout the world on Swedish export prospects are reviewed. E.S.

## PAPER AND PULP MILLS

ANON. A guide to western mills for delegates and for those who stayed home. Pulp & Paper 23, no. 10: 71-6, 78 (September, 1949).

In connection with the TAPPI Portland convention, September 11-15, 1949, information is given on particularly interesting features of pulp and paper mills and converting plants in Washington, Oregon, California, and British Columbia. R.R.

ANON. Improvements at Stevens and Thompson Company. Paper Trade J. 129, no. 12: 106 (Sept. 22, 1949).

In the stock preparation system, all beaters have been replaced by three Hydrapulpers, each with a large water tank above it which allows for accurate measurement of the water added to the stock and permits the rapid dilution of stock with no lowering of water pressure, such as would otherwise result. Pulpwood is stored in ¾-cord bundles which makes it possible to store more wood in a given area and saves in handling costs. Most of the pulp is received from Canada as bleached soda or sulfite pulp in 400 to 500-pound bales. Inside the mill, they are handled by a Cleveland tramrail screw grab and cab-operated crane, which speeds handling and makes it possible to store more pulp on a given floor area. R.R.

ANON. Mando's expansion and modernization program nears completion. Paper Trade J. 129, no. 12: 91-3 (Sept. 22, 1949).

An illustrated survey is given of the expansion and modernization begun by the Minnesota and Ontario Paper Co. at International Falls, Minn., in 1945. The new bleach plant with a daily rated capacity of 100 tons of bleached pulp is now in operation. The operations center chiefly on kraft pulp, although equipment is also available for processing sulfite pulp. The new filtration plant is built for a capacity of 15,000,000 gallons/day and can be expanded to double that figure. The Permutit Spaulding precipitation and coagulation system is employed, followed by sand filters. Water is also treated chemically for bacteria control and the removal of objectionable organic coloring matter. The No. 4 paper machine has been completely rebuilt and modernized and the efficiency of the No. 3 Insulite machine has been increased by the installation of a suction press roll. The new waste-disposal plant, now undergoing trial runs, has facilities for dewatering waste bark, sawdust, and other waste material for use as fuel in a specially designed steam boiler. Two 80-ton General Electric Diesel switching locomotives have been added to the company's railway subsidiary. R.R.

ANON. Many improvements at Nekoosa-Edwards mills at Nekoosa and Port Edwards. Paper Trade J. 129, no. 12: 99-102 (Sept. 22, 1949).

Among the additions and changes recently made by the Nekoosa-Edwards Paper Co. are a new 40-ton Diesel-electric crane, a Dilts Miami waxer which can do surface, dry, and one-side waxing and which applies the wax by squeeze rolls, and a Cameron winder with score cutters on the No. 4 machine at Nekoosa; new Fourdrinier sections on the No. 5 and 6 machines, a center-wind drum reel on the No. 7 machine, and an expansion of the bleaching facilities at Port Edwards. Construction is under way at the Nekoosa kraft mill to provide for the installation of a continuous brown-stock washing system to replace the present diffuser system. An addition to the Nekoosa filter plant will more than double its capacity when it is completed. R.R.

ANON. Powell River development program completed. Paper Trade J. 129, no. 12: 81-4 (Sept. 22, 1949); *cf.* B.I.P.C. 19: 101.

An illustrated summary is given of the projects included in the expansion program of the Powell River Co. which has been completed. R.R.

ANON. St. Andrew Mills Limited; successful installation of new plant. World's Paper Trade Rev. 132, no. 3: 188, 190 (July 21, 1949).

A brief illustrated description is given of the new specialty-tissue machine constructed by Bertrams Ltd. and installed at St. Andrew Mills, England, including three Milne beaters, a Bird saveall, and a Sall consistency regulator. The machine is driven by four Harland electrically interlocked d.c. motors and is designed for speeds ranging from 170 to 850 ft./min. to produce any type of high-quality cellulose wadding. E.S.

ANON. What kraft mill did to make operations flexible. Pulp & Paper 23, no. 10: 46, 48, 51, 54, 56, 59-60, 62 (September, 1949).

A rather detailed, illustrated description is given of the recent additions to the Crown Zellerbach kraft mill at Port Townsend, Wash. In the wood preparation department a new outside wood conveyor, a new barking plant with a Stetson-Ross knife barker for cants, a Bellingham wheel-type hydraulic barker, a hydraulic slab barker, and Sumner chippers, and a sawmill breakdown plant for canting defective and oversize (larger than 42 inches in diameter) logs have been added. In the new screening addition there are Sumner shaker screens and a Lombard oversize-chip crusher. New equipment in the digester house includes the eighth digester, with a spot-welded 18-8 stainless steel alloy lining, external heat exchangers on all digesters, and circulating pumps on three digesters. Pulp washing and screening improvements include a new Swenson-Nyman washer and five Bird Jonsson knotter screens, one ahead of each washer; five new Trimbey screens fitted with Monel plates with 0.090-inch perforations have been put after the washing stage. A new Bauer pulper has replaced a hammermill for preparing pulp from screen linings for linerboard and three Morden Stock-makers have been installed before the beaters and jordans to produce higher strength paper. In the chemical recovery plants, a film-type sextuple system of Goslin-Birmingham evaporators and a Dorr white-liquor system have been installed. Brown radiation pyrometers automatically maintain constant temperatures in each kiln. The new steel and concrete multiwall bag plant includes a Smith & Winchester tuber, a Coty tuber, a Coty single bottomer, a four-color press, 11 sewing machines, 13 grocery-bag machines, a carry-bag machine, a wax

dipper, and valving and specialty equipment. A flow sheet shows the new pulping cycle at the mill. R.R.

KELLEY, L. C. British Columbia Pulp & Paper Co. Ltd., modernizes Woodfibre and Port Alice plants. Paper Trade J. 129, no. 13: 24-8 (Sept. 29, 1949); *cf.* B.I.P.C. 19: 413.

An illustrated summary is presented of the changes in the wood plant, steam and power center, and water-supply system of the Woodfibre plant and in the wood plant, digester house, screen and machine rooms, pulp-handling system, acid, bleach, and caustic-storage plants, and boiler and power houses at the Port Alice mill. R.R.

LEOPOLD, HERBERT. Jap paper combine breaks up. Pulp Paper Mag. Can. 50, no. 10: 98 (September, 1949); World's Paper Trade Rev. 132, no. 6: 391 (Aug. 11, 1949); Newsprint Service Bur. Bull. no. 380: 7-8 (Sept. 17, 1949); Svensk Papperstidn. 52, no. 17: 434 (Sept. 15, 1949); Paper Ind. 31, no. 7: 854 (October, 1949).

In the middle of July, the Oji Paper Manufacturing Co. (which had 57 paper machines) was broken up and three separate firms with widely scattered ownership were set up: the Tomakomai Paper Manufacturing Co. with 10 machines, the Tosuji Paper Manufacturing Co. with 26 machines, and the Honshu Paper Manufacturing Co. with 21 machines. Brief reference is made to other smaller companies. E.S.

MCGINN, E. P. Improvements at Finch, Pruyn & Company, Inc. Paper Trade J. 129, no. 12: 84-90 (Sept. 22, 1949).

The author gives a brief history of the Glens Falls, N.Y., company, including the additions to the original paper and pulp mills which began operating in 1905. Since 1938, the grades of paper produced have gradually been changed from newsprint, hanging, and halftone book to higher grades of groundwood printing and converting papers. Within the past few months, a continuous peroxide bleaching system with a capacity of 120-130 tons/day has been put into operation. A 5000-gallon batch of bleach liquor will treat about 20 tons of groundwood, a 65-100% mixture of groundwood, or any proportion of sulfite pulp. An illustrated description, including flowsheets of the bleach plant and of the disintegrator and broke system, is given of the preparation of the groundwood and unbleached sulfite pulp, the addition of rosin size and alum, the filler-clay system, the Ross air systems and Ross Briner economizer for utilizing the waste-heated vapor rising from one of the paper machines for heating the ventilating and drying air and the fresh water used by the mill, and the Liebeck disintegrator for taking care of broke. R.R.

SHERMAN, WALTER. Flambeau improvements. Paper Trade J. 129, no. 12: 96-9 (Sept. 22, 1949).

Improvements at the Flambeau Paper Division of the Kansas City Star Co. are described. A 90,000-pound capacity boiler and two 1000 kw. Diesel generators have been installed; a new General Electric Diesel electric locomotive for switching and a Manitowoc speed crane for handling wood have replaced obsolete yard equipment; the wood-storage capacity has been increased by the purchase of land and installation of a railroad track; a chemi-pulp accumulator, additional capacity in the acid plant and screen room, and a hypochlorite bleacher have increased the sulfite capacity to 100 tons per day; the addition of a tank has increased the bleached sulfite-slush storage capacity by 70 tons; and a size press, driers, and an electric motor drive have been added to the No. 2 paper machine. R.R.

## PAPER MACHINE OPERATION

FLYATE, D. M., and SHUKHMAN, F. G. Methods of increasing the productivity of papermaking machines. Bumazh. Prom. 24, no. 3:18-22 (May-June, 1949). [In Russian]

Several suggestions are given for the improvement of the operation and product of papermaking machines. Automatic control equipment is essential for increasing the speed of the machine. Vortraps should be installed to remove mineral and metallic impurities; longer screen life, increased paper quality, and reduced spoilage and breaks will result. The uniformity of pulp concentration should be carefully controlled; otherwise, a paper will be produced which does not meet standard specifications. Foam should be removed at the headbox by means of an overflow device. The suction boxes should be arranged as closely as possible to one another; it is claimed that such an arrangement will increase vacuum efficiency. 5 figures and 7 references. E.G.S.

## PAPER SPECIALTIES

ANON. Celery bleaching paper. Paper & Twine J. 23, no. 7: 13-14 (September, 1949).

Celery-bleaching paper is composed of two or three plies of kraft paper laminated with asphalt, in which jute, cotton, hemp, or sisal strands are embedded for added strength. The paper, which is re-usable, is usually bought in 10,000-foot rolls, 10 or 12 inches wide. It is placed against the growing stalks so that only the foliage is visible. R.R.

ANON. New method for waterproof banding of celery. Modern Packaging 23, no. 1: 75 (September, 1949); Packaging Parade 17, no. 200: 34 (September, 1949).

A new heat-sealing, coated, high wet-strength paper band label ("Benband") for celery retains its color and will not come unsealed even though it is water-soaked. The ink is water-insoluble and contains heat-sealing components which combine with a thermosealing waterproof adhesive coating to produce a permanent seal, unimpaired by the ink on the surface. Washed and trimmed celery stalks are carried to the banding section by a conveyor belt and are banded by five small semi-automatic machines. R.R.

ANON. Plastics on the wall. Modern Plastics 26, no. 12: 71-5, 160-3; 27, no. 1: 88-91, 156, 159-60 (August, September, 1949).

Descriptions are given of representative plastic "wallpapers" and tiles, most of which are easily applied; their characteristics are discussed and, in some cases, prices are given. The products considered in the first section of the article include Marvalon, a reinforced cellulose fiber coated with Geon or Vinylite resins; Varlar, a thermoplastic resin-integrated paper; Sandura-Wall, a strong paper covered with a tough transparent formulation of urea-alkyd resins; vinyl sheeting, such as Kalistron, Vinylite, and Sealtuft; Life-wall, a vinyl resin with pigments and filler, calendered to a specially impregnated backing; Wall-Ever Vinylite, a latex-impregnated, nonwoven backing on which vinyl-resin sheeting is cast; Lumite wall covering, a woven saran material; a wallpaper laminated with a 0.00088-inch cellulose acetate film; and Tru-Grain papers, combinations of paper and cellulose resins. In the second part of the reference, more or less rigid wall coverings are described, including polystyrene tile as produced by various companies; Mirror-Tile, a high-pressure phenolic-melamine product; Mura-Tex, a plastic asbestos material; Marlite, a base sheet of tempered Duolux hardboard with a baked-on

urea-resin finish; high pressure laminates, such as Micartaboard, Formica, and Consoweld, which use paper or board as a base material; and polyester continuous laminates with paper or cloth such as Westplak. R.R.

BLAKEMORE, FRED T. The Pullman Company: user of paper. Am. Paper Merchant 46, no. 9: 23, 44-5 (September, 1949).

Figures are given of the huge amounts of various paper items—cups, towels, tickets, wrapping paper, hat bags, etc.—used last year by the Pullman Co. The Pullman Press alone accounts for a large tonnage. The company now makes its hat bags of slightly creped paper which is less noisy than that originally used. Although the sulfite double manila-lined news used for Pullman car diagrams is excellent considering the price, there is need for a comparably priced paper which would have better erasure characteristics. A further outlet for paper would be its substitution for the tracing cloth preferred by the engineering department because of its permanence and strength. R.R.

FALDNER, JOSEF. A few facts about cigarette paper. Wochbl. Papierfabr. 77, no. 8: 231-2 (July 31, 1949). [In German]

The requirements of noncombustible and combustible (the latter in particular) cigarette paper are discussed. The combustible papers may contain up to 30% filler (calcium or magnesium carbonate or a mixture of both); these contribute to the whiteness and opacity of the paper, as well as to its uniform burning, which may be further improved by the addition of certain salts. These contribute also to the formation of a pure white paper ash which clings firmly and in the form of a tube to the tobacco ash without flaking on the smoker. Since the paper is subjected to considerable stresses during its manufacture, a good tensile strength is essential. High porosity of the paper (but without pinholes) has a decided influence on the taste of the tobacco; hence, the best paper must possess a high porosity. The paper has also a decided influence on the percentage of nicotine contained in the tobacco smoke. Noncombustible papers, particularly those of a glassy transparent character, result in up to 50% nicotine in the smoke, whereas with highly combustible papers this figure decreases to 25% and even less. E.S.

KLEIN, HUGO. Paper stocks for the blueprint industry. Paper Trade J. 129, no. 11: 39-42; no. 13: 21-3 (Sept. 15, 29, 1949).

Papers used for blueprinting are tracing, blueprint, brownprint, and diazotype papers. Tracing papers are used for the drawings from which the prints are made. They must have sufficient roughness to abrade enough graphite from the hard-grade pencils usually preferred to give a continuous opaque line; be capable of several erasures in the same spot which leave no "ghost," and still permit clear, sharp redrawing; take ink readily, without feathering, deeply enough so that it will not flake off after drying, but not so deeply as to prevent erasures, and without puckering from the wetting action of the ink; be little affected by atmospheric humidity; possess high tear resistance; be unaffected by intense actinic light and heat; and possess printing transparency. The latter quality necessitates a bluish tint or no color, uniform paper formation, uniform caliper, cleanliness, and freedom from slime spots, dirt specks, etc. Prepared tracing papers, which are natural tracing papers impregnated to make them more translucent, should have a lower finish and greater strength, uniformity, and freedom from dirt and spots than natural papers; they are usually less susceptible to atmospheric humidity and their color is not quite as important as that of natural papers. Blueprint papers are sensitized or coated by a series of rolls which apply

an excess of solution, usually to the felt side of the paper; the excess is removed by scrapers and the paper is dried at temperatures up to 200° F. The printing process is described. Blueprint stock should be chemically nonreactive, which involves guarding against the presence of reducing substances in the sizing. The standard fiber content is 50% rag or cotton linters; appreciable quantities of 25% rag or cotton linters and of all-wood papers are also used. High wet tensile strength, folding endurance, tearing resistance, and ease of trimming are important characteristics. In addition, the paper must not curl or pucker unduly when wet, its surface must possess good wet-rub qualities, and the absorption of the coating solution must be uniform and neither too deep nor too shallow. Blueprint paper should be seasoned for two or three months before being coated. The paper stock should be as opaque as possible and have a yellowish or pinkish tint. When properly made, brownprints are far more permanent than blueprints or diazotype prints and are therefore used not only in the customary weights for intermediate negatives, but also in 24- and 30-pound weights for permanent records. The papers are coated, usually on the felt side, with a solution strongly acid in tartaric, citric, or oxalic acids. The prints are made similarly to blueprints. Reducing substances in the paper must be avoided. Heavily sized, 100% high-grade rags or cotton linters are usually used for the furnish. A high wet tensile strength, tearing resistance, ease of trim, freedom from puckering and curling, and good wet rub are important; folding endurance, relatively deep, uniform chemical absorption, a clean, blue-white stock, uniform formation, and resistance to yellowing caused by heat and light are desirable. One month's aging is the average. Brownprint papers for intermediate negatives must have maximum opacity of brown and maximum translucency of white; the stock must actually be a tracing paper suitable for coating and printing. Brownprint papers, like tracing papers, can be transparentized. Diazotype papers produce a positive print from a tracing and are additively processed—each process adds to the stock and takes nothing from it. One type is developed by ammonia gas or vapor, another by a liquid solution. The coating solution is usually applied to the felt side in much the same way as for blueprint papers, but the weight of chemicals deposited is less and they should not penetrate into the paper. To combat curling, which presents the greatest physical problem, the paper is usually back-coated with water or a weak gelatin, gum arabic, etc. solution. An all-sulfite sheet is best for the usual weights; the pulp should be as free as possible from lignin and pentosans. High-grade rosin-alum is used for beater sizing and starch for tub sizing. Titanium dioxide or similar loading materials are widely used for obtaining opacity, which is very important; promising work has been done on the use of small quantities of soft, short-fibered pulps to fill the voids between the sulfite fibers. The sheet should be blue-white, trim easily, have good tear resistance, high folding endurance, and good brightness, and must withstand mechanical and chemical erasure and take inked corrections without feathering; specks are undesirable. The possibility of using laminates for both blueprint and diazotype print papers is suggested. The most difficult sheet used in the blueprint industry is the transparent diazotype paper, a special tracing paper-base stock coated with a special diazotype solution to produce opaque lines against a translucent background; it must combine the good features of tracing-paper stock, except for glue tub sizing, with those of regular diazotype-paper stock, except for its opacity. Wet-type transparentized diazotype paper is the most difficult and exacting paper which the coater produces. R.R.

M. A. Creped paper. Papeterie 71, no. 6: 213-15 (June, 1949). [In French]

The principles of one-way creping of thin tissues and heavy kraft papers are explained with the help of two diagrams. Among recent patents, those of

Rudolf Haas of the Zellstofffabrik Waldhof (French patent 868,983) and the Lilla Edets Pappersbruk A. B. (French patent 919,756) are mentioned and reference is made to the American practice of x-creping. E.S.

PAPER SALES. Kraft: king of wrapping papers. Paper Sales 9, no. 9: 25-7, 32, 34, 36 (September, 1949).

The 1948 production of unbleached kraft paper was approximately 2,200,000 tons, about 10% more than in 1947, the previous high record year. Although lower prices indicate the return of competitive selling, cost factors will probably hold prices at their present levels. Kraft can be used wherever wrapping is done; its sale is largely unaffected by seasonal fluctuations. Questions and answers are presented to provide the salesman with information regarding kraft wrapping paper in general, pulp stock, available colors, surface finishes, grades, and sizes, special kinds, principal uses, and potential markets. R.R.

PAPER SALES. What to sell to retail gift, novelty and stationery shops. Paper Sales 9, no. 9: 20-2, 40, 42 (September, 1949).

In addition to presenting new holiday items to retail gift, novelty, and stationery shops, the paper salesman should also be prepared to show products for year-around use, such as gift wraps, ribbons, and seals for use in the store and for retail selling, party favors, display crepe papers, shelf paper, paper mats, doilies, cups, drinking straws, plates, forks, spoons, and other household needs. A list of resale and use items is appended. R.R.

PILIE, EDMUND G. Demonstrations help sell paper towels. Paper Sales 9, no. 9: 23, 36, 38 (September, 1949).

The large quantity of paper towels purchased and the possibility of their use as "leaders" in sales promotion campaigns and in sales calls make them a profitable item for any paper salesman. The author describes his method of selling by demonstration. R.R.

ZUCKER, MILTON. Paper for web offset printing. Tappi 32, no. 9: 398-9 (September, 1949).

The author considers paper the principal factor which is retarding the rapid development of fast four-color web offset printing in the publication field. With the exception of newsprint, uncoated papers (ordinary and supercalendered) run without trouble; however, the reproductions lack the smooth look obtained with coated paper. Experience with coated papers has shown that at speeds up to 400 ft./min. most performed satisfactorily. However, no coated paper has yet been found which proved adequate at the higher speeds. Most machine- and conversion-coated papers show slight evidences of piling in a few minutes, the condition getting successively worse until, after 5000-10,000 impressions, it becomes so bad that the blanket must be washed. Recently, however, promising sheets have been delivered by some mills, which showed only slight or no pick in a Vandercook proving press with a 500-poise ink and which piled only moderately on printing. Mill runs with these improved papers are needed before definite conclusions can be reached. E.S.

## PHOTOCHEMISTRY

BOLLIGER, A., and HINKS, N. T. Photolysis of cellulose in the presence of tungstic acid. Australian J. Sci. 11: 60-1 (1948); C. A. 43, no. 3: 1181 (Feb. 10, 1949). [Abstract only available]

Filter papers impregnated with tungstic acid were found to contain 0.6% of reducing substances (expressed as glucose) after 10 days' exposure to

sunlight. Controls treated with sulfuric acid yielded only 0.06% glucose. Similar degradation occurred in the presence of phospho-, silico-, and borotungstic acids. The effects were more marked under exposure to light from a mercury-vapor lamp. E.S.

### PHYSICAL TESTING—INK

WALKER, W. C., and ZETTLEMOYER, A. C. The NPIRI Production Grindometer. Am. Ink Maker 27, no. 9: 67-9, 93 (September, 1949).

Among the methods used or suggested for fineness-of-grind measurement of printing inks are visual and microscopic examination, turbidimetry, sedimentation, "spin-out," and drawdown gages. Only the last mentioned seems to meet the requirements of a production control method. The Wedge-Grit and the North Standards or Hegman gages are briefly considered. The National Printing Ink Research Institute has developed three gages, or Grindometers, designed to do a more precise job of measuring the prevalence of course particles in inks, and a Production Grindometer, which consists of a machined block and an Adco scraper. The recommended evaluation method with the Production Grindometer involves the reporting of two numbers: the first points where there are three and ten scratches. The double number is quite reproducible and gives a more complete picture than a single number. The spread between the two gives an indication of the relative frequency of the coarsest particles. 8 references. R.R.

### PHYSICAL TESTING—PAPER—IMPACT RESISTANCE

VERBAND SCHWEIZERISCHER PAPIER- UND PAPIERSTOFF-FABRIKANTEN. *Technische Kommission.* Determination of the impact resistance of paper (fixed impact experiment). Textil-Rundschau 4, no. 6: 220-1 (June, 1949). [In German]

The text of the Swiss tentative standard VSPPF-EMPA C 1101 is given, which specifies a type of puncture tester, a hammer-pendulum instrument constructed by Alfred J. Amsler, Schaffhausen, for tearing a preconditioned clamped paper strip, 15 mm. wide, by impact of a hammer attached to a pendulum which, on release, drops 475 mm. and strikes the center of the clamped section (100 mm. wide). According to the basis weight of the paper, three interchangeable hammers are used, whose impact corresponds to 5, 10, and 40 kg./cm. Ten samples each are tested in the machine and cross-machine direction of the paper sample and the average is reported. E.S.

### PHYSICAL TESTING—PAPER—SAMPLING

ANON. Strip cutter model STFI. Svensk Papperstidn. 52, no. 15: 374 (Aug. 15, 1949). [In Swedish]

Brief reference is made to a cutter for producing uniform sample strips for paper testing. The device was invented by B. Ivarsson of the paper chemistry department of the Swedish Forest Products Laboratory in Stockholm; patent protection has been sought. E.S.

### PHYSICAL TESTING—PAPER—SIZE RESISTANCE

WILSON, WILLIAM S. Mechanism of water resistance; the effect of beating. Tappi 32, no. 9: 429-32 (September, 1949); *cf.* B.I.P.C. 18: 697; 19: 498.

In two previous papers it was indicated that the exterior surfaces of pulp

fibers were made completely hydrophobic by engine sizing, and three tests for measuring sizing were suggested. These tests seem more readily justifiable scientifically and more informative practically than some of the standard tests now in use. These new tests are the equilibrium-water pickup, the wet-break, and the liquid water-permeability tests. These three tests were tried on several series of pulps beaten to different degrees of freeness. On waterleaf sheets all three tests showed improvement with increased beating. On sized sheets, however, all tests gave higher results, but the order was reversed. That is, the more highly beaten pulps showed poorer results than the lightly beaten pulps. These data indicate that lightly beaten or large fibers are far more responsive to sizing procedures which have very little effect on highly beaten pulp. The author considers that this confirms his idea that the relatively large rosin particles do not adhere readily to very small fibrils, and that the water found in the equilibrium-water pickup test is not necessarily all inside the fibers (as was previously believed), but that some of it may be between the tiny unsizable fibrils. Certain interesting relationships between the tests are shown graphically. 6 figures. E.S.

### PHYSICAL TESTING—PAPER—THICKNESS

TRACERLAB, INC. Measure thickness of sticky, wet, polished or fragile sheet materials. Chem. Processing Preview 12, no. 9: 46 (September, 1949); Chem. Eng. News 27, no. 39: 2802 (Sept. 26, 1949); Chem. Eng. 56, no. 10: 136 (October, 1949); Svensk Papperstidn. 52, no. 16: 405 (Aug. 31, 1949). [Last reference in Swedish] *cf.* B.I.P.C. 19: 795.

A beta-ray thickness gage using radioactive isotopes is described for measuring thin sheet material and plus or minus variations from thickness specifications. The essential components of the gage are a source of beta radiation from $Sr^{90}$ and a radiation detector. The sheet material to be gaged is inserted between the radiation source and the detector. A part of the radiation emitted is absorbed by the sheet; the amount absorbed is proportional to its weight. One advantage of these gages is that they are not in physical contact with the tested material and cause no marking of delicate surfaces. E.S.

### PHYSICAL TESTING—PAPER—VAPOR TRANSMISSION

SARGE, THEODORE W. WVP at 0° by manometric method. Modern Packaging 23, no. 1: 127-9, 186 (September, 1949).

The author presents data obtained for the TAPPI round-robin water-vapor-permeability-test project on various packaging materials by a modified manometric method. The apparatus, consisting essentially of a modified General Foods gas-transmission cell housed in a bell-jar vacuum system enclosed in an insulated box, is described and illustrated and the determination method is discussed (*cf.* B.I.P.C. 17: 369-70, 719). Data are tabulated which were obtained on six materials (saran, cellophane, Pliofilm, and laminated glassine, cellophane-kraft, and waxed paper) by this method and, for comparison, by the hygrometric sweep-gas method (*cf.* B.I.P.C. 19: 717). Considering the great differences in apparatus and technique, there is reasonably good agreement between the two methods except for 300-MSAT cellophane and laminated glassine. Air permeabilities of the packaging materials at 77° F. and 50% R.H. are given to establish relationships to WVP's at 0° F. The order of permeability established by the manometric method is approximately the same for moist air at 77° F. It must be remembered that, although low WVP rates at 0° F. are fundamentally important, other characteristics such as sealability, printability, low-temperature flex, clarity, etc., also influence the

commercial applicability of the material. No single material possesses the maximum in all required properties; therefore, it is good technology and good business to select packaging barriers on the basis of good data and nullify defects by combinations wherever possible. 7 references. R.R.

### PLASTICS—FILLERS

SMITH, ROGERT R. Moulding sawdust. Wood 4, no. 10: 34, 36 (October, 1949).

The author discusses the drying and molding equipment, preparation of the sawdust, requirements of the bonding agent, the molding process by which the resin-treated sawdust is processed, and the limitations of the process and the product. R.R.

W. H. S. Sawdust shackled. Ind. Eng. Chem. 41, no. 9: 10A, 12A (September, 1949).

Reference is made to Xylite, a thermosetting plastic from sawdust, developed by H. L. J. Marshall for the Paterson Plastics and Chemical Co., Mobile, Ala. The development work was carried out mainly with pine sawdust and involves an alkaline hydrolysis followed by a reaction with formaldehyde-ethylene dichloride-urea. After the final treatment, the material is ground, put on a hot roll to cake it, and granulated. A special radiation-barrier type has been developed, which bars the rapid passage of nucleonic radiation through its mass by absorption. It cannot be used as a primary shield, but appears well adapted for various operations in handling radioactive elements, as well as for packaging radioactive isotopes in transit and shielding detection instruments. E.S.

### PLASTICS—PAPER-BASE

ANON. Consolidating paper's future. Wood 4, no. 10: 18-19 (October, 1949).

A description is given of the manufacture of Consoweld, decorative and industrial laminates produced by the Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis. The decorative laminate is composed of a core of phenolic sheets, decorative melamine sheets, an overlay, and a balance sheet. The base of the phenolic sheet is a Mitscherlich-type sulfite-pulp paper. The decorative melamine sheet is an α-cellulose paper colored in the beater for solid-color effects or lithographed with pigmented inks for design effects. The balance sheet is usually an uncolored α-cellulose pulp paper and the overlay sheet is an α-cellulose pulp transparent paper. The mats of impregnated papers are heated in a hydraulic press, which causes the resin to flow uniformly throughout the lay-up. Decorative and industrial laminates are manufactured by basically the same process. The latter are usually thicker and utilize a phenolic- instead of a melamine-type resin. R.R.

### PLASTICS—TESTING

DEWAARD, R. D. Autographic method for measuring stiffness of nonrigid plastics. Modern Plastics 27, no. 1: 115-16, 118, 164, 166, 168 (September, 1949).

The flexibility and temperature dependence of flexibility of elastomers must be known if their usefulness is to be predicted. The author briefly reviews current testing methods and describes an apparatus and technique for measuring the stiffness of nonrigid plastics over a wide temperature range. Use is made of electric resistance-wire strain gages attached to suitable

weighing beams to measure and record the force exerted on a cantilever specimen. In addition to the sensitivity and convenience it affords through autographic recording, the accuracy of the method is guaranteed by the fact that the straining rate can be held nearly constant at a desired value. Stiffness data are given for two plastics to illustrate the scope of the equipment. R.R.

## PRINTING AND PRINTER'S INK

DAMME, HARRY J. Offset press troubles . . . causes and remedies. Modern Lithography 17, no. 9: 30-2, 93 (September, 1949).

Offset press troubles may be caused by the need of finer mechanical adjustments in the inking unit, the dampening unit, the plate or blanket cylinders, or the feeder unit, by improperly prepared plates, the physical properties of the paper being used, or by the ink formulation. They are usually classified as scumming or tinting, printing trouble (from satisfactory plates), paper troubles, register difficulties, and streaking. Various phases of these problems are considered and suggestions are made for their alleviation. R.R.

SNETHEN, CLARENCE R. ROP newspaper color printing. Am. Ink Maker 28, no. 9: 63, 65-6, 89 (September, 1949).

The demand for ROP (run of paper) color work has grown more quickly than the newspaper industry's ability to handle it. More than 95% of the newspaper presses now on order are to be equipped with color-printing facilities. ROP color in daily editions increased 59% and in Sunday editions 79% from 1947 to 1948. Newsprint manufacturers are helping to solve the problems incident to color printing by trying to produce a whiter sheet with a better finish. Ink requirements call for an ink that will be brilliant and print successfully at press speeds of 410-650 papers/min. R.R.

WELP, GEORGE. Color matching aids. Am. Ink Maker 28, no. 9: 59, 61, 89 (September, 1949).

The seven basic factors that affect the final results in general commercial and publication printing are type of press, printing process, kind and color of printing surface, ink-film thickness, desired drying speed, kind of printing plates, and character of the original copy. The proper information regarding these factors must be furnished to the inkmaker for a good color-matching job. With specialized types of printing, such factors as light and heat fastness, moisture resistance, handling conditions, and package contents also influence ink selection and formulation. In a multicolored job, the sequence in which colors are printed is important. Where instruments are not readily available, standard lighting conditions are of greatest importance. The recording spectrophotometer, a scientific check on visual observation, measures the amount of light reflected by the sample as compared with that reflected by a standard white sample, and plots the reflectance values, thus permitting accurate control and color comparison. The use of specialized equipment, such as color-matching charts, is suggested for the small-scale printer who does his own color matching. The raw materials used in ink formulation should be carefully considered, since various sources of a constituent may cause variations. R.R.

WHEELWRIGHT, WILLIAM BOND. The papermaker looks at lithography. Paper Maker [U. S.] 18, no. 2: 24-9 (September, 1949).

The discovery of lithography by Aloys Senefelder in 1796 is described. The process quickly became a popular medium for artists and commercial printers. It was introduced into the United States about 20 years after its invention. When the photographic halftone came into wide use in the last decade of the 19th century, lithography lost the advantages it had held in pictorial and color work over letterpress. With the introduction of the offset press in about 1905, lithography regained some of its former popularity. The limitations on press speeds have almost disappeared and the quality of the work has steadily improved. 4 references. R.R.

### PULP AND PAPER—IMPURITIES

BERTON, A. Spark spectrography using, as a support for the analyzed material, a band of paper moving at constant speed between electrodes. Bull. soc. chim. France no. 1-2: 94-9 (January-February, 1949). [In French]

A strip of paper 15 × 100 mm. is affixed to the periphery of a drum. The drum is rotated by a synchronous motor so that the projecting strip passes between two graphite electrodes at a speed of approximately 10 mm./second. If a condensed electric spark is passed across the sheet, carbonization takes place and spectra are obtained from the elements present in the paper. The method has been used for the determination of the following elements in paper: calcium, silicon, magnesium, aluminum, titanium, barium, and iron, which have been detected frequently, whereas manganese, copper, and lead have been found in rare cases only. The method can be applied to the identification of paper samples, for instance, in legal cases. For use with biological materials, ashless filter paper is impregnated with the solution to be analyzed and treated in a similar manner. 7 figures. E.S.

### RAW MATERIALS

VOLLE, WILHELM. Possibilities for the development of the European paper and board industry. Wochbl. Papierfabr. 76, no. 11: 267-8 (November, 1948); 77, no. 6: 166-8 (June, 1949). [In German]

In the first part of the article the author argues that the scant wood supplies of Western Europe should be reserved for the manufacture of steamed groundwood and chemical pulp which yield stronger products than ordinary groundwood pulp and can, therefore, be re-used more often, although the initial yield is lower. In the second part, the question "Is the exclusive use of coniferous or deciduous wood essential?" is answered in the negative, and the possibilities of potato tops, sunflower stalks, cereal straw, rape straw, hemp, and flax straw for a variety of paper and board products are emphasized. A pulp and paper or board mill in the center of agricultural activities is proposed, in which the fibrous waste products of agriculture supply the raw material for the mills and the industrial and agricultural activities complement each other. E.S.

### RAYON

MCINDOE, WILLIAM C. Rayon. Chem. Eng. 56, no. 9: 131-3 (September, 1949).

In spite of the fact that the West has a substantial consumer and industrial outlet for rayon—the 1948 potential market is estimated at 193.2-214.6 million pounds—adequate cellulose and water, good plant sites, and an adequate labor supply, there are no rayon manufacturing plants in that region. Such an industry would greatly benefit western United States and Canada. R.R.

## RAYON—VISCOSE PROCESS

PRESTON, J. M., and NARASIMHAN, K. I. Viscose rayon fibres. II. The orientations of skin and core. J. Textile Inst. 40, no. 5: T327-37 (May, 1949); *cf.* B.I.P.C. 19: 344-5.

In the first part of this article it was shown that the fiber refractometer measures the refractive indexes of the core of viscose fibers; it is well known that the Becke method measures the refractive indexes of the skin of fibers. By a combination of these two methods several series of specially prepared fibers were examined, ranging from comparatively homogeneous ones to fibers with well-defined skins. The results of three of these series are given in the present study. They show that the orientations of skin and core are nearly identical when both are small; however, when the fibers are stretched in spinning, the orientation of the skin increases faster than that of the core. The fibers with most pronounced skin show the differential effect of stretch most markedly. The hypothesis is advanced that there are two kinds of structure present. The skin is considered to have a partially planar structure oriented in the radial direction, whereas the core has the usually assumed spatial structure. The hypothesis was tested against other known facts and all deductions were found consistent with the proposed structure. A theoretical quantitative relation between the skin and the core structure is devised as a first approach to the solution of the problem, without any attempt at refinement. 3 tables, 6 figures, and 19 references. E.S.

## RESEARCH

ERDTMAN, HOLGER. Forest chemistry. Finnish Paper Timber J. 31, no. 14: 253-6; no. 15: 271-5 (July 31, Aug. 15, 1949). [In Swedish] *cf.* B.I.P.C. 19: 347.

The author stresses again the need for a better insight into the chemistry and biochemistry of the forests (of which wood chemistry is but one branch) and discusses some of the problems of "forest chemistry," which have already, at least partially, been studied by various investigators. Particular emphasis is placed upon the biological equilibrium of forest growth; each human interference represents an upsetting of nature's balance and the factors for restoring the same need a better understanding. The problems cannot be solved by chemists alone, but require the collaboration of botanists, zoologists, and practical foresters. Among the problems briefly reviewed are the chemistry of soils, humus and humic acids, and the promoting or antibiotic activities of micro-organisms, particularly the symbiotic association of certain mycorhiza fungi (*cf.* corticrocin, B.I.P.C. 19: 265); the role of lichens; forest diseases, such as red rot (*Fomes annosus*), the susceptibility of pure spruce stands, the much greater resistance of mixed forests, and antibiotic soil organisms; the specificity of certain fungi in the selection of the substrate; the protective substances (heartwood extractives) to be found in certain trees (*cf.* B.I.P.C. 19: 511, 882) and their fungicidal and insect-repellent properties; and the possibilities and dangers of such preparations as DDT and Gammexan. E.S.

HERITAGE, C. C. Research in the pulp and paper industry. Paper Mill News 72, no. 38: 72, 74, 76, 78, 91 (Sept. 17, 1949); Wood 4, no. 7: 24-5, 40-1; no. 8: 24, 40-2; no. 9: 30, 42 (July-September, 1949).

The author considers the fundamentals of organizing and administering the development function of a company, the scope of the work, its place in the company, how such a program can be set up and of what it consists, and the

cost and financing of this activity, especially as it applies to smaller organizations. The paper was presented before the Forest Products Research Society at Grand Rapids, Mich. R.R.

PHILBROOK, D. A. Activities of the Northeast Research Centre. Pulp Paper Mag. Can. 50, no. 9: 125-6 (August, 1949).

The Northeast Pulpwood Research Center, Gorham, N.H., is sponsored by and directly serves pulpwood-operating companies located in the northern New England states, New York, and Pennsylvania. The research organization conducts investigations on and keeps its member companies informed regarding new and improved pulpwood-logging techniques and promotes the improvement and development of mechanical methods of producing and transporting pulpwood to effect greater economies, stabilize labor and raw-material supplies, and attain maximum production from forest lands. These services are discussed and examples given. R.R.

## SCALE MODELS

PUSEY AND JONES CORPORATION. Models in research. Paper Mill News 72, no. 38: 56, 58 (Sept. 17, 1949).

Illustrated descriptions are given of the development, by means of small-scale models, of such designs and equipment as the "Rapi-Drape" method for installing Fourdrinier wires, the Flow Spreader, the Stream-Flow Cylinder Mold, and the "Vitalizer" for removing water or condensate from the interior of a drying cylinder. R.R.

## SEMI-CHEMICAL PULPING PROCESS

EVANS, JOHN C. W. Abitibi's new pulp process. Pulp Paper Mag. Can. 50, no. 9: 65-9 (August, 1949).

Following a history of the Sturgeon Falls Division of the Abitibi Power and Paper Co. which, in 1948, changed over to the manufacture of board by the neutral sulfite semichemical pulping process, the author considers the wood treatment, cooking, refining, the paper machine, the recently completed cooking-liquor plant, power and steam generation, and personnel. At the present time, all wood is purchased. Since the beginning of the new process, 21 species of soft- and hardwoods have been used; red cedar is the only wood considered unacceptable, because of the difficulty of pulping the bark. The five spherical digesters are insulated with three inches of asbestos cement and covered with a mastic coating. Chips are cooked for four hours at a maximum pressure of 120 p.s.i. The percentage yield is over 90%, compared with 45-50% for normal sulfite and kraft pulping. Bauer refiners produce stock with a Canadian Standard freeness of about 600; when it leaves the Claflin refiners, the stock has a freeness of approximately 400. The paper machine, which formerly produced newsprint, trims 144 inches and produces 100 tons of board per day. There are 32 driers, with a Ross Grewin system to increase drying capacity and promote more uniform drying. In the neutral sulfite process a mixture is used composed of sodium sulfite and sufficient soda ash so that the liquor remains alkaline to the end of the cook. Some of the sodium sulfite was formerly purchased in the United States; in the new liquor plant, it is prepared more economically from soda ash and sulfur. The steam plant, consisting of two stoker-fired and three hand-fired boilers, produces over 80,000 lbs./hr. during the winter. R.R.

KELLER, E. L., and MCGOVERN, J. N. Neutral sulphite semi-chemical pulping of aspen. Tappi 32, no. 9: 400-5 (September, 1949).

Neutral sulfite semichemical digestions of aspen (*Populus tremuloides*) were made at the Forest Products Laboratory in yields of 74.0-75.5% with sodium sulfite pulping liquors buffered to give spent liquor pH values in the range of 7.2-8.9 with (*a*) sodium bicarbonate, (*b*) sodium carbonate, (*c*) sodium hydroxide, and (*d*) sodium sulfide. The results of these digestions were compared with those from digestions with an unbuffered sodium sulfite liquor made from technical-grade chemical, giving a spent liquor pH value of 6.7. The results were as follows: (1) cooking time decreased with increased alkalinity in cooking. The reduction was approximately one half in increasing the spent liquor pH values from 7.2 to 8.9. (2) Pulp strength was little affected by the kind or degree of buffer except for a tendency toward slightly higher tearing strength when sodium hydroxide and sodium sulfide were used. (3) The brightest pulps were obtained with no added buffer or with small amounts of buffering agent giving spent liquor pH values of 7.2-7.4. A considerably darker pulp was obtained in digestions buffered to a final pH value of 8.9 with sodium sulfide. (4) When fairly large amounts of sodium bicarbonate were used, a slightly higher pulp brightness was obtained by not relieving the excess digester pressure over that of the steam. 2 tables, 3 figures, and 10 references. E.S.

## SETUP BOXES

ANON. Ice cream 'n cake. Modern Packaging 23, no. 1: 102-3 (September, 1949).

The rise of self-service merchandising has prompted the adoption of a window package for ice cream-cake rolls so that the product can be seen before purchase. The reverse-tuck setup carton is made of unparaffined white butterboard stock with the moistureproof cellophane window adhesively attached to the edges of a die-cut, vignette-type opening in the top flap. The printing is two-color letterpress. The cake sheets are made by a Chicago company which holds the patent on the product and are shipped to the ice cream manufacturer in corrugated shipping containers, each cake separated from the others by baking paper. The long roll is wrapped in waxed paper and cut to retail size which leaves the ends of each roll uncovered for visibility through the carton window. A kraft bag closed with gummed tape is used to store six packages. R.R.

## SHIPPING CONTAINERS

WRIGHT, STUART E., and HAYES, KIRBY M. Fibre and wooden egg cases: report of a survey of performance in cold storage warehouses. Shears 67, no. 681: 30, 32-3 (September, 1949).

The study was conducted by the Fibre Box Association and the Poultry Branch, Production and Marketing Administration, U. S. Department of Agriculture. The greatest preference among warehouse personnel was found to be for wooden cases because they can be stacked higher with greater safety and in less time, require less dunnage, stand up longer in storage, are less susceptible to damage, and allow more ventilation than the fiber cases. The most common objections to fiber cases were that they tend to bulge and sag when piled, lean and prevent proper air circulation when stacked, cannot be stacked as high as wooden cases, are difficult to stack because of nonuniform size and design, and collapse if they are second-hand. Most warehousemen had no preference between corrugated and solid fiber cases. Cases having covers with center or end tuck-in flaps were most popular because they were easily opened. A case with a partially telescoped cover, the regular slotted case, the special center-slotted case, and a corrugated fiber case constructed with asphalt laminations were approved. It is suggested that a

stronger, more moisture-resistant case be produced and more air holes be allowed for ventilation; the construction should be uniform, and the case strong enough to permit piling in eight tiers without sagging. Cases that were taped along the top edges seemed more rigid than others. More and wider stripping facilitates stacking. Wooden cases were found to vary less in size and stand up better in cold storage than the fiber product. R.R.

### SHIPPING CONTAINERS—PALLETIZING

DALY, DAVID M. Savings by use of disposable pallets. Am. Paper Converter 23, no. 9: 23, 36 (September, 1949); *cf.* B.I.P.C. 19: 230.

A report is given of comparative shipments made by the Bristol-Myers Co. utilizing paper pallets for one shipment and none for the other. The loading and unloading time for the palletized shipment was much less and a saving of 10 cents/cwt. was effected in transportation costs. A 200-pound test corrugated deck has been found adequate when the shipping cases are large enough to bridge the gap between the posts of the pallet; the 350-pound test pallet is used when the container dimensions are such that no pattern can be achieved which places the bottom units on one or more posts. When combined with glued loading, the disposable pallet will successfully carry any properly proportioned container, the contents of which are sufficiently rigid to retain the solid-block effect through switchings and handlings. R.R.

### SHIPPING CONTAINERS—STATISTICS

BETTENDORF, HARRY J. Fibre box industry statistics. Fibre Containers 34, no. 8: 137-48 (August, 1949); *cf.* B.I.P.C. 19: 113.

The fiber box industry in 1948 produced over 64 billion sq. ft., of which corrugated accounted for over 61.75 billion and solid fiber for the residual of almost 2.5 billion. The trend for corrugated fiber box production has been distinctly upward, whereas solid fiber has shown a tendency to decline since the 1931 peak, except for the wartime demand for solid fiber boxes of the V-type, which reached a high in 1944. As in connection with all branches of the paperboard group, there has been a decline in demand for fiber boxes, so that the volume in the first half of 1949 was about 12% below that of the identical period in 1948. Detailed statistical information on both types of board is given in numerous tables, diagrams, and pie charts, chiefly covering the period from 1938 to 1948 inclusive. E.S.

HANWAY, PAUL S., and BETTENDORF, HARRY J. Fibre can and tube industry statistics. Fibre Containers 34, no. 8: 174-6 (August, 1949); *cf.* B.I.P.C. 19: 113-14.

The fiber can and tube industry is really a composite of fiber cans, tubes, cores, bobbins, ribbon blocks, cones, and specialties. Although it lost much of its war-gained volume, the year 1947 was a heavy production year in catching up on textile backlogs; in 1948 the industry was cutting down its backlog of orders and board consumption was about 2% lower than in 1947. The growth in value, on the other hand, was about 1% over 1947. The industry establishments are developing new uses daily in substituting products of the industry for other products or for additional uses. A major development which offers market possibilities is the impregnation of paper and paperboard with plastic or other strengthening materials. The fiber can and tube industry is presently heavily over normal capacity and survival of some may be answered only through initiative and creative development. The number of plants recorded as operating in 1949 showed an increase of about 3½% over 1948, but was somewhat under the level of the number of plants operated in 1947. E.S.

MATHER, GLENN, and BETTENDORF, HARRY J. Fibre drum and pail industry statistics. Fibre Containers 34, no. 8: 177-8, 180-1 (August, 1949); *cf.* B.I.P.C. 19: 114.

The growth of the fiber industry and recent developments are briefly reviewed, including a special label which a chemical manufacturer uses on his 44-gallon fiber drums and which carries, in addition to the usual data for product identification, helpful information on the handling of such drums and their polyethylene liners. The (estimated) number of units produced in 1948 would indicate an increase of about 3% over 1947, and the 1948 production would seem to have been five times that of the year 1940. It is believed that fiber drum production in the first half of 1949 has declined. E.S.

## SHIPPING CONTAINERS—TESTING

AMERICAN SOCIETY FOR TESTING MATERIALS. *Committee D-10.* Container committee points toward performance standards. Shears 67, no. 681: 29 (September, 1949); *cf.* B.I.P.C. 20: 42-3.

Reference is made to the recent meeting of the committee at which increased interest was shown in the development of performance standards and the correlation of data. Brief mention is made of the reports given by the chairmen of various subcommittees. R.R.

ELDER, L. W. Functional package design. Chem. Eng. News 27, no. 38: 2682-6 (Sept. 19, 1949); Modern Packaging 23, no. 2: 138-42, 196, 198 (October, 1949).

Important product properties to be considered in packaging are discussed, including moisture loss or gain, spoilage by atmospheric oxygen, the tendency to lose volatile flavors or pick up foreign odors, oil or fat seepage, susceptibility to insect infestation, and siftability. Literature references to these subjects are mentioned. Moisture-equilibrium curves are given and discussed for starchy and fibrous products, amorphous syrup solids, and crystalline soluble solids. A method for testing the water-vapor permeability of papers and films is briefly described (*cf.* B.I.P.C. 13: 154-5) and data on the WVP of 10 films and their costs per unit area are tabulated. The General Foods research organization makes sample surveys on products from retail shelves as a means for estimating the time lapse between production and final sale and the moisture pickup during that time. Steps are then taken to correct any under- or overpackaging. The final selection of material is based on cost and merchandizing considerations of shelf life desired in the critical areas. The most successful, hermetically sealed, flexible packages for protection against spoilage by atmospheric oxygen consist of a metal foil laminated to a smooth-surfaced ply such as cellophane, with the foil surface carrying a heat-seal coating; a third ply of strong paper may be necessary for mechanical strength. However, such packages cannot be made rapidly enough to compete with the conventional can or well-sealed glass jar. There is no standardized method for rating packaging materials in terms of organic vapor permeability comparable to that for WVP. The best protection against odor transfer is provided by metal foil and then by such plastic films as saran and highly hydrated cellulosic materials such as cellophane and glassine. The most important factors involved in determining the degree of protection needed against fat seepage are the relative proportion of absorbent solids, e.g., fiber, starch, and protein, in relation to the fat, the melting point of the fat, and the moisture content of the nonfat solids. The packaging materials which are good barriers for organic vapors are usually also grease-resistant. Paper impregnation with proteins such as zein and casein give moderate grease protection and chlorinated plastics give excellent protection. Standard

methods for evaluating greaseproof qualities are provided by the TAPPI turpentine test. Infestation and sifting involve purely mechanical aspects of package forming and can generally be prevented in paperboard cartons by a simple, tight paper overwrap applied with a water-base adhesive so that the wrapper shrinks tightly onto the carton. Unless a synthetic film-forming or coating material can be found which is superior to paraffin and no more expensive, waxed paper will probably continue to be used for most of the protective packaging. 4 figures, 5 tables, and 17 references. R.R.

## SLIME PREVENTION

BERG, HARVEY E. Slime treatment service. Paper Ind. 31, no. 6: 687-8 (September, 1949).

The uses of the various alkaline chlorophenates are outlined and the different steps in the Nalco (National Aluminate Corp.) system for slime control described. L.E.W.

DEAN, CHARLES W. Equipment for feeding liquid slime control toxicants into pulp and paper systems. Tappi 32, no. 9: 419-21 (September, 1949).

To aid in feeding the desired amount of liquid toxicant into the mill system, dependable feeding equipment must be installed. Two basic feeding equipment systems are discussed. In the first, a small piston-type positive displacement pump is utilized. A rotameter, either indicating or recording, is added to this pump to give a visual or permanent record of the amount fed. In addition, other equipment, such as a cycle controller, proportioning equipment, etc., may be added. This system is satisfactory but its initial cost is high. A second system utilizes a gear-type positive displacement pump plus a rotameter. These two units cost approximately $100 and provide a reasonable, dependable feeding system when used as recommended. The piping arrangement provides for recirculating a portion of the toxicant between the pump and drum. The desired amount is fed into the system through the rotameter by adjusting the by-pass valve. As a result of the small flow to the system, it has been found impossible to use a valve in the main line and obtain constant feeding because of clogging of the valve by foreign material. The by-pass arrangement overcomes this difficulty. It is believed that the utilization of either of these feeding systems, plus a consistently maintained inventory control, will help in attaining economical slime control. 1 table and 4 figures. E.S.

KIPP, ROBERT. Regular cleaning prevents slime troubles. Paper Ind. 31, no. 6: 686-7 (September, 1949).

The author stresses the use of Oakite Composition No. 22, an alkaline material with high detergent value, in the regular cleaning of paper mills; application methods are briefly outlined. For lithcoated surfaces, Oakite Compound No. 84A is recommended, which is slightly acidic in nature, but completely safe for this use. L.E.W.

MCKEE, WILLIAM N. Chemical toxicants for slime. Paper Ind. 31, no. 6: 684-6 (September, 1949); *cf.* B.I.P.C. 20: 43.

The author discusses sources of slime contamination, chemical toxicants used in controlling slime, and their application, as well as special considerations which must be given to papers used as food wraps. In conclusion, reference is made to PMAS, the trade name of phenylmercuric acetate preparations marketed by the W. A. Cleary Corp. L.E.W.

## STANDARDIZATION

BURT, R. G. History of standardization in India. Indian Pulp and Paper 3, no. 12: 476-8 (June, 1949).

The history of standardization in India is considered, beginning with the decision of the Railway Board in 1909 to place orders for railway supplies with domestic concerns and concluding with the establishment of the Indian Standards Institution and the participation of Indian delegates in the Commonwealth and the International Standards Conferences in 1946. R.R.

## STARCH

BARKER, S. A., BOURNE, E. J., and PEAT, STANLEY. The enzymic synthesis and degradation of starch. Part IV. The purification and storage of the Q-enzyme of the potato. J. Chem. Soc.: 1705-11 (July, 1949).

An improved method is described for the isolation and purification of the Q-enzyme of potatoes. The Q-enzyme prepared by this method effects almost a 90% diminution of the absorption value of amylose with the concomitant liberation of only 2% (as maltose) of reducing end groups. The preparation is free from α- and β-amylase, maltase, and fatty acids. The amylose-degrading action of Q-enzyme functions at an optimum of pH 7.0 and temperature, 21 ± 1° C. Although Q-enzyme is unstable in aqueous solution, it can be stored for long periods without appreciable loss in activity when it is freeze-dried. E.S.

BARKER, S. A., BOURNE, E. J., and PEAT, STANLEY. The enzymic synthesis and degradation of starch. Part V. The action of Q-enzyme on starch and its components. J. Chem. Soc.: 1712-17 (July, 1949).

The end product of the action of Q-enzyme on amylose is a red-staining polysaccharide, having a ramified structure and an average chain-length less than that of amylose. This polysaccharide, like that produced from potato starch by Q-enzyme, is indistinguishable from natural amylopectin. The hypothesis of Bourne and Peat (*cf.* B.I.P.C. 16: 306-7) that Q-enzyme catalyzes the conversion of amylose into amylopectin is substantiated. E.S.

BARRY, V. C., HALSALL, T. G., HIRST, E. L., and JONES, J. K. N. The polysaccharides of the Florideae. Floridean starch. J. Chem. Soc.: 1468-70 (June, 1949).

The polysaccharide designated Floridean starch, which is known to occur in many red algae, has been isolated from the fronds of *Dilsea edulis*. It is shown to consist entirely of glucose residues. Investigation of its oxidation by the periodate ion shows that it is structurally different from normal starches or glycogens in that it contains a large proportion of 1,3-linked glucose residues. It is resistant to attack by crystalline β-amylase. E.S.

BOURNE, E. J., SITCH, D. A., and PEAT, S. The enzymic synthesis and degradation of starch. Part III. The role of carbohydrate activators. J. Chem. Soc.: 1448-57 (June, 1949); *cf.* B.I.P.C. 16: 306-7.

The function of carbohydrate activators in the synthesis of amylose by purified plant phosphorylase (P-enzyme) is discussed. The theory of Cori

is supported, which pictures the synthesis as the growth of chain units from end groups provided by the activator. The activating powers of amylose and amylopectin have been compared, and the effects of (*a*) acid hydrolysis, (*b*) β-amylolysis, and (*c*) phosphorolysis on the activating power of each of these components of starch have been examined. The conclusion is reached that potato P-enzyme functions by the endwise apposition of glucose residues (derived from glucose-1 phosphate) to a pre-existent chain (a "template chain") of 1,4-linked glucose members. The template chain may be an independent chain as in amylose, or an "outer" chain of a branched structure of the amylopectin type. It is shown that a template chain may consist of as few as 5-6 glucose members. Other workers, notably Weibull and Tiselius, have suggested that the minimum length of a template chain is three glucose units. Some evidence is also provided here that a template chain has an optimum, as well as a minimum length. This optimum length appears to be of the order of 20 glucose units. The cross linkages of amylopectin are shown to constitute obstructions to the degradative function of P-enzyme as well as of β-amylase, and the striking inference can be drawn from this and previous work that none of the three enzymes examined, namely plant phosphorylase and the α- and β-amylases, is capable of inducing scission of the 1,6-glycosidic links of branched amylopectin structures. E.S.

## STATISTICAL METHODS

BEALL, GEOFFREY. Determination of distribution of molecular size in a sample of cellulose. J. Polymer Sci. 4, no. 4: 483-513 (August, 1949).

The present study is concerned with the improvement of the arithmetic treatment involved in the determination of the distribution of molecular size in a sample of cellulose. The experimental basis considered is fractionation of the sample by successive precipitation; the problem would be essentially the same if fractionation were by successive solution. There seems to be good reason for believing that the fractional number distributions may be reasonably well represented by binomial distributions. On this basis the number distribution or, by derivation, the weight distribution has been reconstructed for the sample. In the present illustrative cases the numerical operations of approximation are so laborious as to make dubious their general and immediate acceptance. This difficulty is not, however, inherent in the fundamental concept and of no consequence in the present exploratory study. A substantial advantage of theory of the kind proposed might be that, by improved arithmetic analysis, the degree of fractionation could be reduced in justification of labor of calculation. Thus, one of the major problems of the current and accepted numerical procedure, where points on the accumulation of the weight function are considered, is that of dealing with the upper range of the sample. This difficulty can be met, to some extent, by obtaining several very small fractions in the region involved. Under the proposed scheme, the necessity for fine fractionation in this region disappears. In connection with an artificial experiment and a set of real data, it has been shown that results very different from those usually found may exist. The artificial experiment was one where it was supposed initially that all the circumstances were known in connection with a sample of material like cellulose and its single fractionation. Then, using only the resulting number average and weight as data, the sample distribution was reconstructed with singular fidelity. In contrast, it appeared that the generally accepted procedure of numerical analysis would lead to conclusions at distinct variance with those initially assumed. Similar reconstruction was made for a set of physical determinations which involved the division of a sample of degraded cotton cellulose into five fractions. The difference between the results on the present binomial assumptions and those from customary procedure was of the

same general character as in the case of the artificial experiment. It is very probable that the accepted numerical analysis of data from fractionation may misguide a worker. In particular, it seems that he will underestimate the amount of highly polymerized material in his sample. Two appendixes by Leif Jørgensen are included. 5 references. E.S.

BICKING, CHARLES A. The use of statistical methods in determining product specifications. Tappi 32, no. 9: 405-9 (September, 1949).

The growth of specification writing began about 1900, three decades before the introduction of the Shewhart control chart. Today, the need is not so much for more specifications as for better ones. The author discusses how prior information necessary for setting reasonable specifications may be minimized, how specifications for a given manufacturing process may be determined which will have a predetermined probability of being met, and how it is possible to determine the risk of failing to meet close specifications and, on the other hand, justify the narrowing of specifications if more uniform quality has an economic advantage. An example is given of how new specifications are set and old specifications reviewed in an organization manufacturing chemicals for the finishing of paper. The technique described may be applied equally well to the determination of paper specifications. The nature of the statistical information used and the mechanics of carrying out the review and determining the specifications are described in detail. 19 references. E.S.

PATTE, W. EDMUND. Nomographic assistance in statistical calculations. Pulp Paper Mag. Can. 50, no. 9: 87-91 (August, 1949).

The author submits two nomographic charts to facilitate common calculations in industrial applied statistics. The first chart enables the precision of an average to be estimated graphically from the number of individual results making up the average, and the range, or spread, of the individual results. A tolerance, $e$, is thus obtained for the observed average $X$, so that the "true" average may be expected within the interval $X \pm e$. This precision, $\pm e$, is associated with reliabilities of 95% or 99.9% according to the scales utilized on the chart. The second chart solves graphically the common equations in statistical control work. Included are the relationships of average and extreme ranges displayed by groups of results to the standard deviation of the individual results, and of the standard of individual results to the standard error of averages, for groups comprising up to 15 individual results. 7 references. E.S.

## STEAM POWER

SCHULZE, REINHARD. Increase in output and reduction in power cost by revamping existing steam-power plants. Wochbl. Papierfabr. 77, no. 6: 169-74 (June, 1949). [In German]

Examples are given which illustrate possible improvements in boiler plants by raising the ceiling of a furnace, changing existing walls, installing underfeed stokers for travelling grates, raising the entire boiler, equipping the furnace room with radiant pipes, etc. As long as the condition of the old boiler is still satisfactory, revamping is much cheaper and more rapid than new construction. 8 diagrams. E.S.

## SUGARS

SUNDMAN, JACOBUS. The properties of the sugar bisulfites and the quantitative determination of the individual sugars, especially

in sulfite waste liquor, by means of the sodium sulfite method. Thesis, Tekniska Högskolan, Finland. Helsingfors, 1949. 144 p. [In Swedish; English summary] English summary also in Finnish Paper Timber J. 31, no. 11: 187 (June 15, 1949).

The purpose of the present research was primarily the development of a method for the determination of individual sugars in admixtures, with special reference to sulfite waste liquor. The reaction of various sugars with bisulfite was studied in detail, and a qualitative and quantitative method was developed based on the differences between the equilibrium constants of the different sugar bisulfites (*cf.* B.I.P.C. 18: 360). It was found that an individual sugar can be identified by the equilibrium constant of its bisulfite compound. The proportions of different sugars in solutions containing sodium bisulfite and mixtures of various sugars can be calculated by determining the directly titratable and bound sulfur dioxide. When the sodium sulfite method was applied to the determination of sugars in sulfite waste liquor (*cf.* B.I.P.C. 18: 402), the following results were obtained: Lignosulfonic acid and compounds possessing the aldehyde group interfere with the sugar determination; however, their removal is not necessary when the acetaldehyde present in the waste liquor is determined quantitatively by distillation in an apparatus developed by Fuchs for lactic acid (*cf.* Z. physiol. Chem. 221: 271-7 [1933]) and an equivalent amount of bisulfite is subtracted from the bound bisulfite in the fermented waste liquor. The sodium sulfite method allows the quantitative recovery of sugar, which has been added to fermented waste liquor. With regard to the fermentable sugars in sulfite waste liquor, the results show that mannose is the dominant type, amounting to 85-90% of the total hexoses present. Glucose is not found in waste liquors from strong sulfite pulp (I); rayon-pulp waste liquors (II) contain, at the most, about 10% glucose. (I) contain about 10% galactose, whereas only traces of this sugar were found in (II). The sugar composition of waste liquors from pine sulfite pulp does not materially differ from that obtained by the ordinary spruce sulfite cook. A waste liquor obtained in sulfite cooking with a magnesium base does not appreciably differ from that of the ordinary calcium bisulfite process with regard to its sugar composition. The absence of glucose in ordinary sulfite waste liquor seems to indicate that, in contrast to earlier theories, wood does not contain any easily hydrolyzed glycosan. 55 tables and 107 references. E.S.

## SULFATE MILLS

CLARK, ALEX. Kimberly-Clark builds new pulp mill in Canada. Crane Valve World 46, no. 3: 87-91 (1949).

With reference to the new sulfate mill at Terrace Bay, Ont., of the Long-Lac Pulp & Paper Co., Ltd. (*cf.* B.I.P.C. 19: 808), the important part played by Crane Limited in supplying piping material and valves for the project is mentioned. 6 illustrations. E.S.

KRAFT, FERDINAND. Marathon in Canada. Tappi 32, no. 9: 14A, 16A, 18A, 20A, 22A, 24A, 26A, 28A, 30A (September, 1949); *cf.* B.I.P.C. 17: 729.

An illustrated description of the mill operations is given. E.S.

## SULFITE WASTE LIQUOR

EMMERSON, DONALD W. Waste sulphite liquor as used in Canada. Indian Pulp and Paper 3, no. 12: 468, 470 (June, 1949).

The author considers the use of sulfite waste liquor for the production of plastics, alcohol, yeast, adhesives, etc. R.R.

FOGLER, H. H., HERBOLZHEIMER, F., STINCHFIELD, R. M., and JENNESS, L. C. Spray drying coefficients for sulphite waste liquor. Tappi 32, no. 9: 389-93 (September, 1949).

Sulfite waste liquor at a concentration of 25% solids was spray dried in a tower drier, and at concentrations of 8, 24, and 45% solids, in a laboratory spray drier. Flue gas at temperatures of 300, 400, 500, and 600° F., was used as the drying medium in both pieces of equipment. A method of calculating an over-all heat transfer coefficient for the vaporization of water is proposed. Values of this coefficient are presented on a volumetric basis for a mean temperature driving force between the dry-bulb and wet-bulb temperatures of the heating medium. These coefficients are found to decrease for the laboratory drier with an increasing concentration of solids in the liquor. The tower drier was operated with the spray and gas in parallel and in countercurrent flow. A higher coefficient resulted from countercurrent operation, the value of which was close to that obtained with the laboratory unit. 4 tables, 4 figures, and 7 references. E.S.

GARDNER, J. A. F. The oxidation of waste sulphite liquor. Pulp Paper Mag. Can. 50, no. 9: 102-4 (August, 1949).

A review is given of the available literature on the chemical oxidation of waste sulfite liquor. It has been shown that alkaline oxidation with mild oxidizing agents can be controlled to yield useful products from the lignin, such as vanillin and its derivatives. The use of strong alkaline or acidic oxidizing agents causes degradation of the lignin to simple organic acids, such as formic and oxalic acids. 34 references. R.R.

GRALOW, B. B. Solubility of calcium sulphate and calcium sulphite in aqueous systems. Pulp Paper Mag. Can. 50, no. 9: 100-1 (August, 1949).

The author reports solubility data gathered from the literature on calcium sulfate and sulfite, which are the principal causes of the scale formation during the evaporation of sulfite waste liquor. It is pointed out that engineering calculations cannot be based on the solubility of a pure aqueous system of calcium sulfite because the presence of sugars and calcium sulfate in sulfite waste liquor have a drastic effect on the solubility of calcium sulfite. 2 graphs. R.R.

SMITH, H. L., JR. Thermal compression evaporation. Pulp Paper Mag. Can. 50, no. 9: 84-6 (August, 1949).

The author considers the recently developed thermal compression evaporation cycle as applied to the recovery of sulfite waste liquor and illustrates the economics of recovering industrial wastes by evaporation. An experimental evaporator built for Northeastern Paper Products Ltd. produces 47 gals./hr. of distillate and a product containing 49% solids from 10% sulfite waste liquor, with a power consumption of about 160 kw.-hr./1000 gals. of distillate. Design calculations are given for a commercial evaporator. A method of recycling the distillate through the evaporator effectively dissolves scale and permits operation with a minimum fouling factor on the heating surfaces. Prime movers for the thermal compression units will be electric motors, condensing, or noncondensing steam turbines, depending on the mill's available power. The possible sulfur dioxide concentrations in the distillate from

this evaporation equipment would be insufficient to warrant its recovery, unless the condensate was not to be re-used and it was unlawful to dump it into streams. A slightly greater condensation of sulfur dioxide would be present in flue gases if the evaporated liquor were burned, but recovery would probably be feasible only if necessitated by legislation. R.R.

STEPHENSON, R. E., and BOLLEN, W. B. Field use of sulphite waste liquor in irrigation water. Tappi 32, no. 9: 422-6 (September, 1949); *cf.* B.I.P.C. 16: 310.

Field experiments over a period of five years were conducted to determine the feasibility of using diluted sulfite waste liquor in irrigation waters. Rates of 10, 20, 40, 80, and 120 tons an acre were applied annually to plots on which potatoes, corn, beans, and cabbage were grown. The various crops were rotated. The results showed that none of the liquor applications had much effect upon the soil after five years of treatment. No consistent effect on the growth of crops was noted. The heaviest rate, 120 tons, or about an acre-inch, was somewhat depressing on the growth of some crops. As a general conclusion, based on field and greenhouse studies, 60 tons or about half an acre-inch can be used annually in dilution with irrigation water without harmful effects. 10 tables and 7 references. E.S.

## SURFACE PHENOMENA

HENNIKER, J. C. The depth of the surface zone of a liquid. Revs. Modern Phys. 21, no. 2: 322-41 (April, 1949).

A brief historical review of the changing theories of effective distances and strengths of intermolecular forces leads to the current concept that, although the powerful forces involved are of very short range, they are transmitted by successive polarization of neighboring molecules to an impressive depth. Thus, the surface zone of a liquid is not merely a monomolecular layer with unaltered liquid immediately underneath, but is a region in which orientation extends effectively to many molecular lengths. The hypothesis is then supported by a review of published data in three groupings: (1) direct evidence of deep surface orientation from phenomena of optical anisotropy, multimolecular adsorption, x-ray diffraction, surface viscosity, adhesion, and the high compressive strength of thin films of liquids; (2) prima-facie evidence of deep surface orientation from electrical conductance of oils, dielectric constants of conducting particles at rest and under shear, stability of soap films, and flow behavior in narrow passages; and (3) circumstantial evidence of deep surface orientation, including data which may be considered open to criticism and explanation by other factors. 174 references. A.M.B.

## SWELLING AND HYDRATION

ELÖD, EGON, and FRÖHLICH, HANS-GÜNTHER. The effect of the fine structure of cellulose hydrate fibers on their properties. Textil-Rundschau 4, no. 4: 117-26 (April, 1949); C.A. 43, no. 14: 5587-8 (July 25, 1949). [In German] *cf.* B.I.P.C. 4: 290.

The swelling of cellulose hydrate fibers in water increases with decreasing fiber density. Surface acetylation of the fiber by the method previously described does not change appreciably the density or extent of swelling. If the acetylated portion of the fiber is dissolved, the stripped fiber will show one of two distinct types of behavior. Type I fibers (which are those formed by spinning viscose into an acidic bath) undergo fibrillar separation at the fiber ends. The extent of swelling of these fibers increases markedly on

removal of the surface layer by acetylation and solution. Type II fibers (which are made by coagulating viscose in hot water or dilute alkaline solutions) retain their fiber structure on stripping and swell less after stripping than before. The density of the type II fibers increases after stripping. It appears that there is a radial distribution of density in the cross section of rayon fibers and that differences in this distribution may be of practical importance. 1 table, 10 figures, and 12 references. E.S.

KASBEKAR, G. S. Swelling of cellulose in neutral salts: mechanism of swelling. Indian Pulp and Paper 3, no. 12: 465-7 (June, 1949); *cf.* B.I.P.C. 19: 589.

The capillary inrush of the swelling agent into cellulose is the first step toward swelling. In aqueous salt solutions, adsorption of either the solvent or solute and its consequent influence on the swelling phenomena is possible. The osmotic theory of swelling is not borne out by experimental evidence. It is suggested that an oxonium compound of cellulose and the neutral salt is formed in neutral salt solutions. The nondiffusible ion formed during its dissociation helps induce swelling and apparently reacts with a molecule of water to liberate a hydrogen ion and simultaneously severs a glucoside linkage of the cellulose molecule. This theory is sustained by the observation that cellulose swelling is invariably accompanied by a shortening of its chain length and an increase in the number of its reducing end groups. The mechanism as diagrammatically represented accounts for the failure to observe preferential absorption of the salt or cation in the later stages of swelling and also the degradation which invariably accompanies such swelling. 12 references. R.R.

PRESTON, J. M., and NIMKAR, M. V. Measuring the swelling of fibres in water. J. Textile Inst. 40, no. 7: P674-86; discussion: P686-8 (July, 1949).

The literature on the swelling of textile fibers in water or very dilute neutral solutions at room temperature and methods of measuring this swelling are reviewed. Attempts by the authors to establish the validity of appropriate methods are reported. 68 references. E.S.

## SYNTHETIC FIBERS

BENDIGO, C. W. Newer synthetics are in the spotlight. Textile World 99, no. 9: 111-30 (September, 1949); *cf.* B.I.P.C. 18: 124.

The article includes general information on polyethylene, Vinyon N staple, azlons, wrapped yarns, and the use of x-ray diffraction diagrams for textile fiber study; data on synthetic yarn consumption in 1949, with figures for previous years also tabulated; manufacturers of the fibers and yarns; data on available sizes of continuous filaments and fibers and their trade names; and the 1949 revision of the synthetic-fiber table, giving information on properties, uses, manufacture, and identification of rayon, nylon, saran, polyethylene, Orlon, Vinyon, glass, azlon, and Plexon, with x-ray diffraction patterns of all but Plexon. R.R.

## TALL OIL

JENSEN, WALDEMAR. Chromatographic analysis of tall oil. I. Determination of neutral matter. Finnish Paper Timber J. 31, no. 12: 225-7 (June 30, 1949). [In English]

Neutral substances in tall oil could be determined rapidly by passing an ether solution of the oil through alumina (which retains the acid fractions)

and then eluting with ether. The equipment is illustrated and fully described, and analyses of a crude tall oil, a refined oil, and a forefraction of oil (rich in neutral substances) are given, and compared with the neutral matter determined in these same samples by conventional analytical procedures. Petroleum ether can also be used in place of ether but the results are lower and less reliable because phytosterol is not eluted from alumina by the solvent. Ether not only elutes unsaponifiables, but also small amounts of saponifiable neutrals. 4 tables and 3 references. L.E.W.

## TURPENTINE

MIROV, N. T., and HAAGEN-SMIT, A. J. Composition of gum turpentine of knobcone pine. J. Forestry 47, no. 9: 721-2 (September, 1949); *cf.* B.I.P.C. 18: 405.

Knobcone pine (*Pinus attenuata* Lem.), a Pacific-Coast species, belongs to the closed-cone pines and is closely related to Monterey pine (*P. radiata*) and Bishop pine (*P. muricata*). Its turpentine is a product of unusual purity and of a very simple composition, consisting almost entirely of dextro-α-pinene. It differs from Bishop pine by the total absence of camphene and from Monterey pine by the absence of β-pinene. 1 table. E.S.

## ULTRASONICS

PERLO, O. Ultrasonics, technique of the future; its possibilities in the paper industry. Papeterie 71, no. 8: 291, 293, 295, 297, 299-300 (August, 1949). [In French]

A general review of ultrasonic applications is presented; only a few possibilities in the paper industry (such as homogenization or disintegration of pulps) are mentioned. L.E.W.

## VENTILATION

MONTGOMERY, A. E. Waste in paper mill drying and ventilating. Paper Trade J. 129, no. 9: 22-5 (Sept. 1, 1949).

The author estimates an approximate average cost of $180 per day for the hot air required for drying and ventilating in a mill producing 100 tons per day. This expense can be cut by the use of a hood designed to provide ample gathering space below it; thus, the very hot, humid air can rise and stratify before being removed by the fans or exhaust stacks. Because the natural draft stack exerts the greatest pull during cold weather when the paper machine requires the least exhaust and the heating is most expensive, it is perhaps the worst offender against economy. Fans afford a constant controllable exhaust volume. The thermostatic control of the supply air temperature is generally recognized as economically desirable, yet many heating units are not so equipped. Equipment must be properly selected, installed, and operated to prevent waste and any opportunity should be taken to secure increased drying capacity from the air when it requires only a relatively small additional expenditure for apparatus, piping, and power for driving the fan. The Briner Economizer, an efficient heat interchanger for abstracting heat from the hood exhaust to heat the incoming outdoor air, may save $21,400 per year in a 100-ton mill located in a warm climate and a greater amount, farther north. Another heat recovery method involves the use of the hot air for heating water which is then used in the process (*cf.* also Paper Mill News 72, no. 38: 78 [Sept. 17, 1949]). R.R.

## WASTE HEAT

ANON. Experimental tower. Pulp & Paper 23, no. 9: 87 (August, 1949); Can. Pulp Paper Ind. 2, no. 10: 20 (October, 1949).

Brief reference is made to an experimental tower, 50 feet high and 12 feet in diameter, built on the roof of a two-newsprint machine room at Powell River, whose purpose is the maintenance of a constant headbox temperature the year around. Fresh water is carried to the top of the tower and distributed by sprayers inside. The spray absorbs the heat from the paper-machine drier-hood exhaust air and the temperature of the water is raised from 40 to 95° F. The hot water is used for the dilution of groundwood wash stock and for the showers at the wet end of the paper machine in place of the customary fresh cold water. The result is a drier sheet, thereby reducing the steam and fuel consumption; approximately $50,000 to $100,000 per year can be saved. An additional tower will be erected after sufficient experience with the first experimental unit has been obtained.
E.S.

## WASTE PAPER

BETTENDORF, HARRY J. Wastepaper statistics. Fibre Containers 34, no. 8: 107-12, 117-20 (August, 1949); *cf.* B.I.P.C. 19: 125.

For the paperboard industry as a whole, waste paper has, in the past, been the most important raw material, representing 55% or more of the fibrous raw materials used in manufacture. However, commencing in 1948, this situation is apparently no longer true, because in 1948 waste paper accounted for only 46.7% of the average board furnish, whereas pulp accounted for a greater amount (48.9%). At the same time, the paperboard industry formerly consumed 84-86% of the total waste-paper supplies; this percentage has declined so that in 1948 the board industry consumed only 77.7%. The basic reason for this change has been the advance of the building and operation of kraft board mills in the South, where production is, in large part, from virgin pulp produced in the same mill from pulpwood. Most of the new kraft mills started production in 1947 and 1948. However, this should not present occasion for worry on the part of waste-paper packers and dealers; it is evident that new areas for the exploitation of pulpwood are limited and future expansion of board capacity is apt to be based on waste-paper consumption, although it is unlikely that this demand will develop in the near future. Waste-paper prices started to slip in 1947 and, in 1948, declined to the extent that currently they do not even cover the costs of handling, sorting, and baling. Wartime studies have shown that 80% of all waste paper comes from business channels and 20% from city homes. The virtual elimination of home collection may help toward striking a balance between supply and demand. Waste paper still represents about 85% of the content of folding boxboards and nearly 95% of setup boxboards. The downward fluctuation is largely in container boards where it used to represent about 50%. Of the total 7,584,500 tons of waste paper consumed in 1948, 5,896,600 tons were used for paperboard, 1,128,500 tons for paper, and 559,400 tons for roofing. Statistical information, supplemented by numerous charts and tables, is included in the article. E.S.

PFULG, FR. Modern waste-paper regeneration. Wochbl. Papierfabr. 77, no. 6: 174-5 (June, 1949). [In German] *cf.* B.I.P.C. 19: 205.

With reference to the description by Drautz of a continuous regeneration plant, the author mentions the pulpers developed in the United States for the wet regeneration of waste paper. The system is continuous and almost fully automatic; a diagram is included. E.S.

## WAXES

BONDY, WINFIELD S. Molten paraffin systems. Paper Trade J. 129, no. 12: 78 (Sept. 22, 1949).

Because of the difficulties arising from dirt and other foreign material acquired during shipment and handling and from storage of slab paraffin wax, some users of paraffin store it in liquid form. When the user is sufficiently near the refinery, tank trucks transport the heated liquid paraffin. Delivery over greater distances is made by tank cars. The wax is loaded as a liquid; when the destination is reached, coils in the bottom of the tank car are connected to the heating medium and the wax is melted and pumped to storage tanks. Since excessive heat will damage the paraffin, the temperature must be accurately controlled. Hot water has been found the most satisfactory source of heat. To melt a 10,000-gallon tank-car lot of paraffin in one day, if the wax is received at 0° F. and heated to 150° F. for storage, about 12,000 pounds of steam per day are required. Approximately 22,000 pounds is needed to maintain 10,000 gallons of wax at 150° F. in an insulated tank with an outside temperature of 0° F. Although there is little possibility of contaminating wax so transferred, it is well to pump the paraffin through a filter before using it in the conversion process; residual dirt may be lodged in a tank or pipe line. Provision should be made to drain off any water present in the tank before the wax is used. Machine baths, tanks, and equipment should be emptied and cleaned regularly. Before storage, samples of the wax should be tested for strength, uniformity, and odor. R.R.

## WELDING

MOORE, JAMISON. Cutting and welding in paper mill maintenance. Tappi 32, no. 9: 385-8; discussion: 388 (September, 1949).

The cutting and welding activities at the Savannah plant of the Union Bag and Paper Corp. are described, including related processes (metal spraying, flame hardening, wrinkle bending, flame straightening, etc.), the training of skilled workers, and safety measures. E.S.

## WOOD

ABELE [WILHELM] The tropical forest as source of European raw materials. Wochbl. Papierfabr. 77, no. 6: 165-6 (June, 1949). [In German]

This is a review, interspersed with the author's own observations on this subject, of a report written in two parts by Franz Heske of the Reichsinstitut für Forst- und Holzwirtschaft, Hamburg-Reinbeck. The first part deals with the enormous wood deficit in western Europe; in the second part, the author discusses the possibilities and problems presented by the African tropical forest for overcoming this deficit. In view of the somewhat alarming fact that the short-lived newspapers (whose contents are only of temporary interest) consume the greatest percentage of the valuable coniferous forests, it is suggested that the first concentrated efforts be made on the development of a suitable groundwood pulp from mixed tropical wood species. E.S.

## WOOD—CHEMISTRY

WISE, LOUIS E., and RITTENHOUSE, RUTH C. The presence of arabinose units in pinewood and in kraft pulp. Tappi 32, no. 9: 397-8 (September, 1949); Das Papier 3, no. 17/18: 337-9 (September, 1949). [Second reference in German]

Arabinose, in small amounts, has been found in the hydrolyzates of the fol-

lowing pines; sugar pine (*P. Lambertiana* Douglas), western white pine (*P. monticola* D. Don.), and Virginia pine (*P. virginiana* Miller). Its presence was shown both chromatographically and by the formation of its characteristic diphenylhydrazone. Thus, it is impossible to differentiate between the "five-needle" and the "two-needle" pines on the basis of their arabinose content. Arabinose was absent from the hydrolyzates of a commercial unbleached spruce sulfite pulp, but was found in the hydrolyzate of a commercial unbleached jack pine sulfate pulp. This presents evidence that, in at least one case, arabinose units are present in the cell walls of a coniferous wood. 13 references. E.S.

## WOOD—DECAY

LUTHARDT, WALTER. Leached wood obtained by means of artificially cultured wood-inhabiting fungi. Holzforschung 3, no. 4: 117-21 (1949). [In German]

Beechwood bolts (I) were inoculated with *Pholiota mutabilis* (II) by the so-called Luthardt technique, and wood samples were removed and analyzed at intervals over a period of three and a half years. Initially (I), specific gravity 0.63, showed 0.85% water and 13.65% (in 1% caustic) solubility, 38.8% (pentosan-free) cellulose, 24.7% pentosans, and 22.9% lignin. After three and a half years, the fungus had removed much of the initial (I); the residue then showed specific gravity 0.22, 33.2% cellulose, 28.6% pentosans, and 23.4% lignin. The author discounts the prevailing theory that white rot primarily attacks lignin. Even during the course of wood destruction by (II), there appeared to be a rather uniform attack both on cellulose and lignin, whereas the pentosans showed a somewhat greater resistance to attack, as indicated by their gradual accumulation and apparent increase. 8 photographs and microphotographs. L.E.W.

## WOOD—EXTRACTIVES

ANDERSON, ARTHUR B. Durability of western red cedar heartwood. Wood 4, no. 10: 38-41 (October, 1949); *cf.* B.I.P.C. 19: 511, 512.

In an attempt to determine the chemical nature of the toxic substances responsible for the durability of western red cedar heartwood, two isomeric phenolic compounds, one a liquid and one a solid, were isolated by distillation of the heartwood sawdust and treatment of the distillate. The products have been identified as cycloheptatrienolonic compounds with the isopropyl group attached to various carbon atoms. A third isomer has also been isolated and the name thujaplicin suggested for the three phenols. Proposed structures are shown. The procedure used to test the toxicities of various western red cedar extractives is described. The toxic principle in the hot-water extractive results from the presence of a fraction containing phenolic compounds. Alcohol, ether, or acetone also readily extract the toxic principles. 5 references. R.R.

BORGIN, GERD LYSTAD. Molecular properties of water-soluble polysaccharides from western larch. J. Am. Chem. Soc. 71, no. 6: 2247-8 (June, 1949); *cf.* B.I.P.C. 11: 66.

The water-soluble extract of the heartwood (I) of western larch (obtained at 30° C.) was 8.4% of the wood and that of the sapwood (II) was 0.9% (pentosan content 13.7 and 11.9%). Sedimentation velocity runs showed that (I) contained one component with a sedimentation constant of $4.5 \times 10^{-13}$ c.g.s. units, whereas (II) contained two components with constants of 4.5 and $1.2 \times 10^{-13}$ c.g.s. units. In (II) the ratio of the components is 3:2, the

component with the higher molecular weight being present in the larger quantity. If the higher molecular component of (I) and (II) is the same material (as appears to be the case), the calculated pentosan content of the higher-molecular component of the sapwood is 8.9%. C.J.W.

### WOOD—MENSURATION

MOUNTAIN, HAROLD S. Determining the solid wood volume of four-foot pulpwood stacks. J. Forestry 47, no. 8: 627-31 (August, 1949).

A method used by the Brown Co. for determining the solid-wood volume by photographing portions of stacked wood and wood piled on trucks or cars is described; the dot-count method (previously used on aerial photographs) is applied to determine the percentage distribution of solid wood, bark, and voids. Dot templates with 200 equally spaced dots are placed over the photographs before enlarging and show white on the prints; the template is offset on the same sample three times, so that no dot will fall on the same point as in the previous print; in this manner 600 dots per photograph or sample are counted. The developed prints are placed in a frame with a magnifying lens in position. The counter determines the number of dots on solid wood on all three samples, divides the total by 600, and the resulting figure gives the percentage of solid wood in the sample. This percentage figure is multiplied by 128 (a stacked cord of 4-foot pulpwood occupies 128 cu. ft.) to give the volume of wood as represented by the sample. The use of the data for checking the scaler's figures, determining the cords necessary to make one ton of pulp from wood from various locations or different species, etc., is described; the accuracy of the method (±1%) has been proved by water immersion tests and tests using volumes obtained by measuring end diameters inside the bark. 3 figures and 1 table. E.S.

### WOOD—MOISTURE

DELMHORST, W. J. Measuring moisture with electric meters. Wood 4, no. 9: 18-19, 40 (September, 1949).

When the suggestions given are followed, the measurement of the moisture content of wood below 25% by means of a resistance-type moisture meter is rapid, destroys no wood, and gives a more accurate determination on a load of wood or a whole board than is possible with the oven test. The meter measurement is confined to the area adjacent to the contact pins. Therefore, such a reading of nonuniform stock may not agree with an oven-dry moisture content, which is the average of the section tested. Most meters are calibrated to read on Douglas fir and must be corrected when used with other species. They are also calibrated for 70° F.; correction is made by subtracting or adding 0.05% for every 10° above or below 70°, respectively. Below the fiber saturation point there is a great change in the electrical resistance of wood for a small change in moisture content. The change in resistance for a given change of moisture content at the wet end of the scale is smaller, with the result that the error arising from poor contact, lack of temperature corrections, and the dependence on a single reading gains in significance. A carefully made oven test is a more accurate determination than that made with a meter, but is made on a sample which is assumed to have the same moisture content as the entire piece of wood or on a few samples representing a load of wood. The technique of oven testing is briefly considered. R.R.

### WOOD—SACCHARIFICATION

HARRIS, ELWIN E. Wood saccharification. Advances in Carbohydrate Chem. 4: 153-88 (1949).

This is an extensive review of the subject from its earliest beginnings to the present state of knowledge, including the history, composition of wood as it influences hydrolysis, decomposition of products of hydrolysis, multistage process, pilot plant experiments, utilization of wood sugars, hydrolysis of wood during sulfite process pulping, and production of alcohol from sulfite waste liquor. 154 references. E.S.

## WOOD OPERATIONS

BUSCH, T. M. Cost reduction in pulpwood handling. Southern Pulp Paper Manuf. 12, no. 9: 36, 38 (September, 1949).

The International Paper Co.'s mill at Georgetown, S.C., procures approximately 150,000 cords of pulpwood per year by the use of company-owned barges and tugs. Truckloads of pulpwood are driven on the deck and unloaded by means of sturdy yard cranes. A special four-legged bridle sling was developed, in which the four ends of the sling are joined beneath the load with a long toggle pin. After the load is set on deck and the sling cables slackened, the toggle pin is withdrawn from beneath the load by means of a cable attached to one of the crane drums. The four ends of the bridle sling are extracted without disturbance of the wood. Great savings in time and manpower resulted from this method and the company is rapidly discontinuing all old hand-loading methods by mechanized procedures. E.S.

CARPELAN, GREGER. Some results obtained in the use of motor saws in timber cutting. Finnish Paper Timber J. 31, no. 13: 241-2, 244-6 (July 15, 1949). [In Swedish]

The advantages and disadvantages of motor saws are reviewed, as they apply to Swedish forestry conditions. The risks for accidents are great; in spite of this fact few accidents have been recorded so far. E.S.

FLODMAN, Bo. Research in efficiency and stability of woods labour in Sweden. Pulp Paper Mag. Can. 50, no. 9: 122, 124 (August, 1949).

Because industrial labor unions in Sweden have been stronger than forestry unions, work simplification and the development of greater efficiency in forestry has lagged behind that of industry. At present efforts toward greater increases in efficiency have been applied to the tools, working technique, and organization of logging; the horse, harness, road construction and maintenance, and equipment as they concern transportation with horses; and truck and tractor hauling. The choice of hauling technique and roads is one of the most important points in logging. A study of efficiency in cutting by hand is almost finished. A safety program goes hand in hand with efficiency research. To offset the instability of woods labor, many companies are providing good housing for woods workers and their families, either scattering them throughout the forest country or concentrating them in small communities with good permanent roads to different parts of the forest. R.R.

SILVERSIDES, C. R. Work simplification applied to woods operations in eastern Canada. Pulp Paper Mag. Can. 50, no. 9: 110-12, 114, 116 (August, 1949).

Work simplification should make people instinctively aware of inefficiencies in their daily work. Each person concerned must determine whether any operation or part of it could be eliminated, substituted, combined, or simplified, or the operation sequence changed to advantage. Flow process and thermometer charts are described which can be used to analyze operations more easily. Time

studies are means of determining how man, animal, or machine performs on a given job and how they should perform. Such studies can be utilized to ascertain the relative efficiencies of each of several possible methods of operating. Stop watches may be valuable in detecting inefficiencies which would otherwise be unnoticed. R.R.

## WOOD TRANSPORTATION

ANON. New log-towing operations; MacMillan initiates new measures. Pulp & Paper 23, no. 10: 112 (September, 1949).

A new form of log towing for waterways where rough weather may be encountered has been developed by the H. R. MacMillan Export Co. for the Nanaimo Sulphate Pulp, Ltd., kraft pulp mill at Nanaimo, B.C. The principal innovations lie in the use of two converted LST landing barges, the superstructures of which have been removed, and in the stacking of logs broadside to the deck, rather than lengthwise. Broadside loading gives greater rigidity to the cargo and decreases its tendency to become unbalanced. Three or four lengths of wire are usually employed to secure the load against possible storms. The logs are large and are, therefore, lifted individually onto the barges by a Diesel-powered hayrack boom. The MacMillan-owned Canadian Transport Co. has two wooden tugs with steel superstructures which are used in the operation. R.R.

KOROLEFF, A., and SILVERSIDES, C. R. Transport of wood by gravity over suspended wire. J. Forestry 47, no. 2: 84-93 (February, 1949); *cf.* B.I.P.C. 17: 736.

A detailed illustrated description of a "gravity powered skyline" logging method of yarding wood is described. It is adapted to steep terrain and partial or clear-cutting systems. Erosion in skid trails is avoided. E.S.

## WOOD WASTE

ANON. Research and development in forest products. Paper Mill News 72, no. 38: 68, 70, 91 (Sept. 17, 1949).

The developments of the Weyerhaeuser Timber Co. in the greater utilization of wood are described, including the production of Silvawool, Silvacel and Silvacon products, and Pres-to-logs. R.R.

ARIES, ROBERT S. Utilization of wood waste: current and potential. Chemurgic Digest 8, no. 8: 4-7 (August, 1949).

Fuel accounts for 74% of the manufacturing waste currently used. In dairy regions, sawdust is utilized for cattle bedding. There is some demand for baled sawdust and shavings for various commercial uses and a limited amount of sawdust is employed for making wood flour. The Northeastern Wood Utilization Council, formed in 1942 for a concerted attack on the problem of low-grade wood and wood waste, suggests the possibility of utilizing waste through improvements in its drying and combustion; conversion into producer gas where the power load is fairly steady; utilization of larger pieces of hardwood waste for small articles such as spools and bobbins; the production of activated carbon and charcoal, which is now rather short in long-term supply; conversion to shredded waste where sawdust for cattle bedding is expensive; the production of wood molasses and yeast for animal feed; the utilization of bark-free waste, other than sawdust, for pulp; the conversion of both soft- and hardwood waste, including that which contains bark, to roofing, insulation, floor coverings, etc.; and the production of fiberboard from sawdust, shavings, and hogged waste and of hardboard from sawdust. Costs and

returns are given for some of the possibilities. Careful study and sufficient capital are required before a waste utilization project can be initiated.
R.R.

ZASADA, Z. A., and RICHARDSON, C. A. Logging and pulping black spruce thinnings. Tappi 32, no. 9: 393-6 (September, 1949); *cf.* B.I.P.C. 19: 284-5.

A study was made on the feasibility of using small diameter black spruce from thinnings, in which logging and pulping costs were analyzed. The cost of producing wood from thinned stands is higher than in regular operations and logging costs are also higher, but the operation is still practical. The small wood requires slightly more handling in the pulp mill, but operations are not necessarily slowed down, and the yield and quality of the pulp are satisfactory.
E.S.

## X-RAY RESEARCH

WARDROP, A. B. Micellar organisation in primary cell walls. Nature 164, no. 4165: 366 (Aug. 27, 1949).

X-ray investigations on cambium from Scotch pine or parenchyma from oat coleoptiles indicate an increase in cellulose micelle size after extraction of the specimens with pectic solvents or with 0.1 *N* hydrochloric acid. This apparent change in micelle size, taken in conjunction with the appearance of additional diffraction rings upon extraction, would seem to indicate a considerable increase in the crystallinity of the specimen as a result of the extraction treatment.
I.H.I.

# Patent Section

*Although the abstracts of the United States patents are prepared from the patents themselves, the initial selection of the patents to be abstracted is made from the* Patent Gazette *and, therefore, it is possible that the patent section will not contain all patents of potential interest to the industry. The abstracts of the Canadian patents are prepared from the claims published in the* Canadian Patent Office Record. *In so far as possible, an attempt will be made to indicate patents issued in both countries.*

*The patent abstracts are listed under the various headings currently used for the abstracts of periodical articles.*

*Printed copies of United States patents can be obtained from the Commissioner of Patents, Washington, D.C.; the price is 25 cents per copy. Canadian patents up to and including December, 1948, are available only as manuscripts or photostatic copies and an estimate of the cost of a patent should be obtained from the Commissioner of Patents, Ottawa, Canada, in advance of the order. With January, 1949, printed copies of Canadian patents are available at 25 cents per copy of less than 50 sheets of printed matter. For patents of 50 sheets or over, the price is $1.00 per copy. Until the printing branch is in full operation and up to date, the printing of specifications will be several months behind.*

## ADHESIVES

BRINKER, HOWARD C., and GEHRENBECK, GILBERT B. Pressure-sensitive adhesive and adhesive tape. Canadian patent 459,977. Filed July 5, 1943. Issued Sept. 27, 1949. 18 claims. Assigned to Minnesota Mining & Manufacturing Company.

A tacky pressure-sensitive eucohesive adhesive consists of a toluene-soluble alkyd resin elastomer reaction product of 100 parts of castor oil and 12-30 parts of citric acid, combined with a lesser proportion of ester gum tackifier and a still lesser proportion of ethylcellulose firming agent; the adhesive forms a clear, transparent coating which does not darken or soften when exposed to sunlight and is adapted for use in transparent pressure-sensitive adhesive tape. E.G.S.

## ALKALINE PROCESSES

FULLER, ROBERT R., and WOODSIDE, VERNON. Regeneration of caustic soda-sodium sulfide cooking liquor. U. S. patent 2,481,408. Filed Aug. 13, 1946. Issued Sept. 6, 1949. 3 claims. Assigned to Mathieson Chemical Corporation. [Cl. 252-183]

A method is given for the preparation of aqueous solutions of caustic soda and sodium sulfide for use in the manufacture of paper pulp by the kraft process; the make-up sulfur and sodium are added to the "green liquor" in the form of sulfur and sodium carbonate in intimate fused admixture with one another in sufficient amounts to generate the cooking liquor. E.G.S.

## ALKALINE PROCESSES—RECOVERY

WILCOXSON, LESLIE S. Method of and apparatus for recovering heat and chemicals. U. S. patent 2,416,462. Filed Nov. 12, 1942. Issued Feb. 25, 1947. 11 claims. Assigned to The Babcock & Wilcox Company. [Cl. 23-48]

This is the same as Canadian patent 450,080; *cf.* B.I.P.C. 19:59. E.G.S.

### ANTI-STICKS

BICKNELL, JOHN A. Separable liner for tacky elastomers. U. S. patent 2,480,352. Filed Nov. 4, 1944. Issued Aug. 30, 1949. 6 claims. Assigned to S. D. Warren Company. [Cl. 117-90]

A paper product which is suitable for use as a liner for tacky elastomers is formed from paper having a base coating which consists essentially of an alkali metal silicate and a finely divided filler; a top coating consists of from 1 to 10 parts by weight of a mineral wax binder and from 10 to 1 parts by weight of a water-soluble (aluminum or zinc stearate) soap in the form of dispersed, preformed discrete particles. E.G.S.

### ASPLUND PROCESS

WIDEMAR, SVEN M., STEEN, KARL E., and ELIASSON, GUNNAR R. Discharge device for fibrous pulp. Canadian patent 459,231. Filed July 15, 1947. Issued Aug. 30, 1949. 9 claims. Assigned to Aktiebolaget Defibrator.

In an adjustable device for the discharge of fibrous pulp from containers (e.g., in connection with the so-called Asplund Defibrator), a turnable closing disk blocks the discharge channel of the device; the disk is eccentrically arranged in relation to the channel and is provided with several openings of different sizes, one of which has an area corresponding to maximum discharge ("blowing-out"); the disk can be turned in its own plane so that a larger or smaller part of the cross section of the channel is laid open through one of the openings. E.G.S.

### BAGASSE

FULLER, CHARLES W. Apparatus for drying bagasse. U. S. patent 2,481,305. Filed Oct. 4, 1945. Issued Sept. 6, 1949. 5 claims. [Cl. 110-7; changed to 263-26]

A tower is provided for drying wet material such as bagasse, wood refuse, bark, and sawdust for use as fuel or in the manufacture of board and paper. E.G.S.

### BARKERS AND BARKING

DOUGLAS, MELVIN. Chain-type cutter for debarking machines. U. S. patent 2,483,338. Filed June 2, 1947. Issued Sept. 27, 1949. 2 claims. Assigned to Harry A. Lowther Co. [Cl. 144-208]

A debarking machine has a shearing or drawing action which permits the bark to be stripped without injuring the surface underneath; the unit is adjustable for trees of different diameters. E.G.S.

### BLEACHING

BRABENDER, GEORGE J., BARD, JOHN W., and DAILY, JAMES M. Method of bleaching cellulosic pulp. Canadian patent 460,024. Filed Aug. 19, 1948. Issued Sept. 27, 1949. 7 claims. Assigned to James M. Daily, Francis L. Daily, and Joseph F. Ryan.

This is the same as U. S. patent 2,466,633; *cf.* B.I.P.C. 19:667. E.G.S.

LEVY, ROBERT M., and BRENNAN, JAMES E. Catalytic bleaching process. U. S. patent 2,480,148. Filed Oct. 14, 1948. Issued Aug.

30, 1949. 6 claims. Assigned to Ecusta Paper Corporation. [Cl. 8-105]

A catalytic process of bleaching cigarette paper pulp yields a pulp with a relatively high copper number for any given viscosity so that the cigarette paper produced from such pulp will have a relatively high wet strength for any given dry strength of the paper. The process consists of mixing dilute aqueous solutions of an alkali or alkaline earth hypochlorite and a water-soluble cobalt or nickel salt, introducing the mixture into an aqueous suspension of the pulp, maintaining the mixture until the desired degree of bleaching is obtained, and removing the reaction products. E.G.S.

MARTIN, MERVIN E., and UMANSKY, MORRIS. Cellulose purification. U. S. patent 2,482,858. Filed Aug. 13, 1947. Issued Sept. 27, 1949. 10 claims. Assigned to Celanese Corporation of America. [Cl. 8-105]

A process for the treatment of unbleached sulfite wood pulp includes the digestion of the pulp with 0.35-0.60% by weight of aqueous sodium hydroxide solution, chlorination of the digested pulp with an aqueous chlorine solution containing 1-2.5% (based on the weight of pulp) of available chlorine, washing of the chlorinated pulp with a 0.025-0.30% (by weight) aqueous sodium hydroxide solution, digestion of the washed chlorinated pulp under superatmospheric pressure in a 0.75-1.5% (by weight) aqueous sodium hydroxide solution, and subjection of the digested pulp to bleaching with an aqueous hypochlorite solution containing 0.5-1.0% (by weight) of available chlorine. E.G.S.

## BOARD

GOSS, WORTH C. Method for rapid manufacture of sheet lumber. U. S. patent 2,480,851. Filed Feb. 5, 1947. Issued Sept. 6, 1949. 6 claims. Assigned to United States Sheetwood Company. [Cl. 18-47.5]

A method is described for making sheet lumber from lignocellulosic fibers; fibers containing about 16% moisture are laid down to form a porous pad, the pad is enclosed in a chamber, high pressure steam (220-550° F.) is admitted to the chamber to effect complete penetration of the pad and steam plasticizing of its fibers, and the pad is compressed (100-1000 p.s.i.) between press platens, while steam is vented from at least one surface of the pad. The steam pressure is relieved, a vacuum is applied to the chamber and pad to flash the remaining moisture in the pad to steam and to cool the pad below steam generating temperature, and the pad is released from the platen pressure. E.G.S.

## BOARD, FIREPROOF

HALL, HORACE W. Method of treatment of ligno-cellulosic material and product resulting therefrom. U. S. patent 2,483,198. Filed March 16, 1943. Issued Sept. 27, 1949. 3 claims. [Cl. 8-115.6]

Urea-formaldehyde glue is applied to the surface of lignocellulosic material, rock wool is applied to the surface, and heat and pressure are applied until the material, glue, and wool react chemically. E.G.S.

## BOARD, LAMINATED

WHITING, LEO R. Modified drying oil compositions, methods of making the same, and methods of coating and uniting sheet mate-

rials therewith. U. S. patent 2,480,206. Filed Feb. 20, 1945. Issued Aug. 30, 1949. 20 claims. Assigned to Bakelite Corporation. [Cl. 154-140]

A method is given for making a flexible laminate by impregnation of moisture-free cellulosic sheets with a liquid binder consisting of a conjugated fatty oil and a catalyst mixture of an oxy-compound of boron and a member selected from the group consisting of α-hydroxy aliphatic acids, *o*-hydroxy aromatic acids, oxalic acid, and the esters of these acids, assembly of the sheets in a sandwich, and subjection of the sandwich to heat and pressure to harden the binder. E.G.S.

## BOARD SPECIALTIES

BULLOCK, WAYNE G. Handle for boxes. U. S. patent 2,482,399. Filed July 28, 1948. Issued Sept. 20, 1949. 6 claims. Assigned to Eagle Paper Box Company. [Cl. 229-52]

A folding suit-box handle is integrally connected to the box at both ends of the handle; the handle may be raised to carrying position above the plane of the box without deforming the box. E.G.S.

CLUTE, FOSTER L., and SCHRODER, HOWARD C. Combined wallpaper display card and color positioning tab. U. S. patent 2,482,963. Filed Feb. 14, 1949. Issued Sept. 27, 1949. 1 claim. Assigned to The W. P. Fuller Company. [Cl. 35-50]

Color-positioning tabs are used in conjunction with a wallpaper display card to present samples of wallpaper and color combinations for the ceiling, drapes, and floor covering, which are appropriate for use with the wallpaper being exhibited. E.G.S.

GOLDMAN, SANFORD L. Collapsible easel. U. S. patent 2,480,918. Filed Aug. 19, 1948. Issued Sept. 6, 1949. 1 claim. [Cl. 40-152.1]

A portable, collapsible picture-display easel, rack, or frame is provided with a slidable transparent cover; the cover is so constructed that it retains a display sheet in position without being locked to the easel at any point. E.G.S.

GOLDMAN, SANFORD L. Transparent loose-leaf binder. U. S. patent 2,480,917. Filed July 3, 1948. Issued Sept. 6, 1949. 2 claims. [Cl. 129-1]

A loose-leaf binder has a transparent front cover; the binding section of the cover is so constructed that suitable fasteners or similar securing devices are not visible from the outer face of the cover. E.G.S.

HENSLER, ELMER G. Method of making paper tubes. Canadian patent 459,650. Filed Feb. 25, 1947. Issued Sept. 13, 1949. 3 claims. Assigned to Canadian Line Materials, Limited.

Paper tubes are formed by winding paper pulp on a metal sleeve, blowing hot air through the metal sleeve and around the paper tube; the metal sleeve expands and shapes the paper tube, which dries from the inside outwardly and sets; the metal sleeve and paper tube are cooled, so that the sleeve contracts and can be withdrawn from the tube. E.G.S.

RENAUD, JOSEPH. Crate, packing case and the like. Canadian patent 459,216. Filed March 21, 1947. Issued Aug. 30, 1949. 1 claim.

A bottle carrier is provided with inside removable partitioning and outwardly expandable walls; the walls are adapted to bulge outwardly to receive a partition locking strip and to hold the strip in operative position when released. E.G.S.

SWARBRICK, JOHN. Display device. U. S. patent 2,482,947. Filed July 12, 1948. Issued Sept. 27, 1949. 14 claims. [Cl. 40-137]

A picture-display device is constructed so that the whole or any part of a picture or design appears to move when the point of observation is changed along a path transverse to the line of vision to the display. E.G.S.

## BONDED FIBER WEBS

MANNING, FRED W. Tampon, sanitary napkin, surgical dressing, insulating material, filter cartridge, upholstery and the like. Canadian patent 459,597. Filed Oct. 4, 1947. Issued Sept. 13, 1949. 4 claims.

A fibrous article is enclosed in a continuous web of promiscuously intersecting, stretch-oriented filaments bonded together by the adhesive character of the filaments to form an integral web. E.G.S.

## CELLULOSE—OXYCELLULOSE

VAN DELDEN, WILLIAM H., and RUST, JOHN B. Oxycellulose products, their manufacture and utilization. U. S. patent 2,482,042. Filed March 21, 1945. Issued Sept. 13, 1949. 3 claims. Assigned to Montclair Research Corporation. [Cl. 260-212; changed to 106-203]

A process is given for the production of degraded or partially degraded and oxidized cellulosic materials which, when refrigerated, are soluble or at least partially soluble or dispersible in dilute aqueous alkali solutions. A mixture of cellulose and a 15-50% aqueous alkali hydroxide solution containing 1-50% by weight (based on the cellulose) of hydrogen peroxide is heated at a temperature between 25° C. and boiling until a 1% solution of the reacted cellulose in an 8% sodium hydroxide solution has a viscosity of 1.9-4 centipoises at 28.5° C. E.G.S.

## CHLORINE DIOXIDE

RAPSON, WILLIAM H., and WAYMAN, MORRIS. Method for producing chlorine dioxide. U. S. patent 2,481,240. Filed Jan. 11, 1946. Issued Sept. 6, 1949. 8 claims. Assigned to Canadian International Paper Company. [Cl. 23-152]

A continuous process for the production of gaseous chlorine dioxide consists of passing a stream of sulfur dioxide vapor and an inert diluent gas through a packed column countercurrent to a stream of aqueous metallic chlorate solution, cooling the column in the zone of greatest reaction, heating the column in the zone of efflux of the spent liquor, and withdrawing a gaseous mixture containing chlorine dioxide and the inert diluent gas. E.G.S.

RAPSON, WILLIAM H., and WAYMAN, MORRIS. Method for removing chlorine from mixtures containing chlorine dioxide and chlorine. U. S. patent 2,481,241. Filed Feb. 15, 1946. Issued Sept. 6, 1949. 9 claims. Assigned to Canadian International Paper Company. [Cl. 23-152]

A continuous process for removing chlorine from a continuously flowing gaseous mixture containing chlorine dioxide, chlorine, and water vapor, consists in constantly adding gaseous sulfur dioxide to the gaseous mixture; the chlorine and sulfur dioxide react in the presence of water to remove the chlorine without substantially decreasing the amount of chlorine dioxide in the gaseous mixture. E.G.S.

## CLEANING COMPOSITIONS

MCCARTER, WILLIAM S. W. Method of producing an adsorbent cleaning material. U. S. patent 2,480,753. Filed Nov. 28, 1945. Issued Aug. 30, 1949. 4 claims. Assigned to Attapulgus Clay Company. [Cl. 252-89]

A method of producing an adsorbent cleaning material comprises forming a mixture of from 1 to 30 parts by weight of cellulosic material (sawdust, wood flour, or paper pulp), and from 99 to 70 parts by weight of fuller's earth, adjusting the water content of the mixture to a value between 40 and 60% by weight, extruding the mixture at a pressure above 100 p.s.i., drying the extruded mixture, reducing the dried mixture to granular particles, and calcining the particles at 750-1200° F. for a period of time sufficient to obtain a volatile matter content between 1 and 10% by weight. E.G.S.

## DISPENSING CONTAINERS

GUEST, MAURICE C. Dispensing carton. U. S. patent 2,480,729. Filed Feb. 18, 1947. Issued Aug. 30, 1949. 2 claims. Assigned one third to Audrey L. Guest and Calvin J. Guest [Cl. 229-7]

A dispensing carton for candy, gum, lozenges, and similar material includes a flap which permits the articles to be dispensed singly from the carton. E.G.S.

## FOLDING BOXES

ARNESON, EDWIN L. Box. U. S. patent 2,483,030. Filed Oct. 26, 1945. Issued Sept. 27, 1949. 4 claims. Assigned to Morris Paper Mills. [Cl. 229-52]

A cardboard clothing box is provided with a removable, interlocking handle which can be inserted into the top wall structure of the box. E.G.S.

CAGE, JAMES. Carton closure. U. S. patent 2,481,288. Filed Feb. 5, 1945. Issued Sept. 6, 1949. 1 claim. Assigned to Reynolds Metals Company. [Cl. 229-39]

A closure construction includes an inserting tongue with slightly curved incisions at the fold of the tab and forming shoulders for the tab; at the point of insertion of the tab, the carton is cut with a compound curve; the middle point of the curve is convex and forms a tongue-like guide for inserting the tip of the tab; on each side of the tongue the curved incision forms two yielding projections. In the initial operation of closing the carton, the tongue serves as a guide for the insertion of the tip of the tab; when the tab

is inserted into the carton, the end curves of the opening bend the sides of the tab; when the tab is fully inserted into the carton, the yielding projections force the bent sides of the tab against the inner face of the carton and the shoulders of the tab under the fold near the ends of the compound curved opening. E.G.S.

CHEMLINSKI, RAYMOND. Carton for ink bottles. U. S. patent 2,481,571. Filed Nov. 4, 1946. Issued Sept. 13, 1949. 3 claims. [Cl. 120-57]

An ink-bottle carton may be converted into a stand for the ink bottle; the lid of the carton may be shaped into a pen rack with an additional shelf to hold the bottle cap. E.G.S.

DUNNING, ROBERT M. Carton. U. S. patent 2,481,405. Filed June 2, 1945. Issued Sept. 6, 1949. 6 claims. Assigned to Waldorf Paper Products Company. [Cl. 229-37]

A provision is made for supporting the inner flaps of a carton during the sealing operation so that external pressure may be applied against the top of the carton to seal the flaps together without danger of folding the flaps inwardly. E.G.S.

MARSHALL, DONALD E., HOWARD, STANLEY R., and CLARK, FRANCIS R. Method of filling and closing cartons. U. S. patent 2,480,587. Filed Aug. 31, 1944. Issued Aug. 30, 1949. 18 claims. Assigned to Colgate-Palmolive-Peet Company. [Cl. 93-6]

A method is given for filling and closing a full package of material in particulate form, such as soap granules or flakes. E.G.S.

VIVIAN, GEORGE S. Container. U. S. patent 2,483,162. Filed Oct. 9, 1945. Issued Sept. 27, 1949. 2 claims. Assigned to Satona Limited. [Cl. 229-57]

A polygonal cardboard container for liquids, semiliquids, and granulated materials is provided with a bottom closure which is formed by folding over the lower portions of the container walls. E.G.S.

ZINN, JULIUS A., JR. Method of assembling containers. U. S. patent 2,480,176. Filed Aug. 23, 1945. Issued Aug. 30, 1949. 8 claims. [Cl. 93-44.1]

A method of assembling cartons, pails, or boxes from cardboard or other sheet material consists of folding a blank around a mandrel, holding the entire side area firmly against the mandrel, and subsequently forming and forcing the bottom elements of the blank against the mandrel while retaining pressure against the entire side area. E.G.S.

## LIGNIN

PEARL, IRWIN A., and WISE, LOUIS E. Method of preparing phenolic materials from lignin. U. S. patent 2,482,594. Filed April 1, 1946. Issued Sept. 20, 1949. 4 claims. Assigned to The Institute of Paper Chemistry. [Cl. 260-600]

A method is given for preparing phenolic materials by reacting isolated soda lignin with sodium chlorite in a hot, weakly acid, aqueous reaction

mixture until the lignin goes into solution, acidifying the lignin solution to a pH of about 2, extracting the acidified mixture with a water-immiscible solvent, and recovering the phenolic materials from the abstract. 6-Chlorovanillin is formed as one of the reaction products. E.G.S.

SANDELL, OSSIAN W., and SÖNNERSKOG, SVEN H. Process for producing valuable products from lignin-containing materials. Canadian patent 459,844. Filed Aug. 25, 1947. Issued Sept. 20, 1949. 12 claims. Assigned to Mo och Domsjö Aktiebolag.

A process for producing valuable products from lignin-containing materials includes mixing one part by weight of the material obtained in the acid hydrolysis of wood (containing lignin and wood polyoses) with about three parts by weight of a 50% sodium hydroxide solution, and then reacting this mixture for four hours with about one-half part by weight of ethylene oxide and about four parts by weight of ethyl chloride at 110° C. and 14 atm. E.G.S.

## MACHINERY—BEATERS

JONES, DWIGHT E. Beater roll. U. S. patent 2,482,712. Filed Sept. 27, 1945. Issued Sept. 20, 1949. 3 claims. Assigned to E. D. Jones & Sons Company. [Cl. 92-22]

A beater-roll construction includes a member having longitudinal knives or cutting bars; the member is rotatable relative to and co-acts with stationary bars. E.G.S.

## MACHINERY—CALENDERS

PUTNAM, CHARLES P. Calender machine. Canadian patent 459,848. Filed Oct. 30, 1946. Issued Sept. 20, 1949. 16 claims. Assigned to New York and Pennsylvania Co., Inc.

A calender machine adapted for treating a paper web consists of a first rigid roll mounted for rotation about a fixed axis, a second rigid roll located in spaced relation to the first roll and mounted for rotation about a shiftable axis, and a number of rotatable calender rolls swingably mounted around the axis of the second roll and mounted for restrained movement toward and away from the second roll. The calender rolls can be swung to a position between the first and second rolls; pressure can then be applied on the second roll to create a pressure nip between the first roll and the adjacent calender roll. E.G.S.

## MACHINERY—CONVERTING MACHINERY

BREHM, PETER. Corner stitching machine. U. S. patent 2,480,542. Filed March 7, 1949. Issued Aug. 30, 1949. 11 claims. Assigned to Downing Box Company. [Cl. 1-11]

A corner-stitching machine inserts metal staples around the corners of fiberboard containers. The clincher block is movable in a plane which is at an acute angle with the direction of movement of the driver. E.G.S.

JENSEN, THORMOD. End-labeling attachment. U. S. patent 2,482,711. Filed Dec. 12, 1945. Issued Sept. 20, 1949. 8 claims. Assigned to American Machine & Foundry Company. [Cl. 216-30]

A labeler is provided in which different lengths of labels may be severed from a label web. To obtain labels of the desired size, the label web is provided with markings imprinted at predetermined equal intervals; each

marking successively stops a photoelectrically-controlled label-feeding mechanism; the web is stopped at a predetermined position relative to a pair of punches which form aligned notches in the opposite edges of the web. The feeding of the web is then automatically resumed to advance the notches to a position opposite a cutter which severs the web across the notches to provide a label suitable for application to the package. When a different length of label is required, a label web having a different spacing of markings is used. E.G.S.

RAY, DON. Carton forming device. U. S. patent 2,483,063. Filed Dec. 21, 1942. Issued Sept. 27, 1949. 6 claims. Assigned to Arden Farms Co. [Cl. 93-51]

A provision is made for folding and assembling a liner and carton blank in a single operation; the outer carton is folded and placed in a mold together with an inner liner which folds and interlocks with the carton elements to form a receptacle for the material to be placed in the carton. The container may be used for butter, oleomargarine, ice cream, cheese, candy, gelatin, and similar commodities. E.G.S.

ROSENMUND, ALFRED L. Box-stapling machine. U. S. patent 2,482,371. Filed Sept. 17, 1945. Issued Sept. 20, 1949. 20 claims. Assigned to Stapling Machines Co. [Cl. 1-8.3]

A controlled, reversible carriage is constructed and arranged to co-operate with the controlling members of the stapling mechanism of a box-stapling machine. 15 drawings are included. E.G.S.

ROSENMUND, ALFRED L. Boxmaking machine. U. S. patent 2,482,370. Filed May 16, 1945. Issued Sept. 20, 1949. 20 claims. Assigned to Stapling Machines Co. [Cl. 1-8.2]

The operation of a stapling mechanism is controlled through a series of switch-operating elements; an endless chain which is synchronized in movement with the main box-blank conveyor bands affords additional operative control. 18 figures are included. E.G.S.

YOUNG, NICHOLAS A., and BREHM, PETER. Box stitching machine. U. S. patent 2,481,057. Filed Nov. 23, 1946. Issued Sept. 6, 1949. 1 claim. Assigned to American Machine Works. [Cl. 1-15]

A wire-stitching machine for boxes and fiber containers includes controls for manually shifting the "clinching post" and manually closing an electrical circuit for starting the staple-forming and stitching mechanism. E.G.S.

ZINN, JULIUS A., JR., and WILSON, MICHAEL J. Carton forming machine. U. S. patent 2,480,177. Filed Feb. 4, 1948. Issued Aug. 30, 1949. 13 claims. Wilson's interest assigned to Zinn. [Cl. 93-44.1]

A carton-forming machine consists of a continuously rotating table which carries a number of carton-forming mechanisms and a conveyor which extends above the surface of the table; the linear speed of the conveyor is synchronized with the tangential speed of the table at the point of discharge from the conveyor to the table. E.G.S.

## MACHINERY—CORRUGATING MACHINE

LANGSTON, BRYANT W. Machine for making corrugated paper.

U. S. patent 2,482,627. Filed Jan. 22, 1946. Issued Sept. 20, 1949. 15 claims. Assigned to Samuel M. Langston Co. [Cl. 154-31]

A corrugating machine includes a corrugating roller for continuously advancing and corrugating a sheet, a roller for applying adhesive to the sheet, separate motors for driving the rollers, means for simultaneously varying motor speeds to correspondingly vary the roller speeds, and means for stopping the sheet-advancing motor without stopping the glue-roll motor. E.G.S.

### MACHINERY—CUTTERS

MATTHEWS, ROBERT J. Paper cutter. U. S. patent 2,482,118. Filed Oct. 10, 1944. Issued Sept. 20, 1949. 4 claims. [Cl. 164-61]

A paper cutter is designed to form a number of parallel slits in cardboard or paper blanks, leaving a predetermined portion of the blanks uncut. E.G.S.

### MACHINERY—DECORTICATING MACHINE

PATTERSON, DAVID E. Machine for decorticating fiber-bearing stalks and leaves. U. S. patent 2,480,602. Filed Aug. 26, 1944. Issued Aug. 30, 1949. 4 claims. [Cl. 19-30]

A machine for decorticating bast and leaf fibers comprises a pair of loosely meshing grooved rolls which operate to break the woody portion, pith, and bark of the stalk transversely at spaced intervals, a table to receive the broken stalk from the breaking rolls, a pair of meshing, spirally grooved feeder rolls which are spaced apart at one end to receive stalks moving transversely toward them, a conveyor mechanism to carry the broken stalks transversely to and between the ends of the feeder rolls, and pairs of rotating, rearwardly and forwardly abrading beater elements on the forward side of the feeder rolls. E.G.S.

### MACHINERY—FELTS

BERGLUND, ORION W. Impregnating paper making felts with polyvinyl alcohol containing emulsion. U. S. patent 2,482,237. Filed Oct. 24, 1946. Issued Sept. 20, 1949. 6 claims. Assigned to The Orr Felt & Blanket Company. [Cl. 117-140]

This corresponds to Canadian patent 448,160; *cf.* B.I.P.C. 18: 726. E.G.S.

BERGLUND, ORION W. Multiple impregnation of papermakers' felt. U. S. patent 2,482,236. Filed Sept. 19, 1946. Issued Sept. 20, 1949. 3 claims. Assigned to The Orr Felt & Blanket Company. [Cl. 117-140]

A method of making felts for papermaking machines with improved abrasion resistance and wet tensile strength includes the steps of (*a*) impregnating papermakers' felts with an emulsion of butadiene-acrylonitrile copolymer containing 10-30% solids; (*b*) curing the rubber at approximately 200-225° F. for three hours; (*c*) repeating the impregnation with the emulsion of butadiene-acrylonitrile copolymer; and (*d*) again curing the rubber at about 200-225° F. for three hours. E.G.S.

### MACHINERY—FILTERS

VALENTE, JOHN E., and WINK, KENNETH R. Filter element and process for making same. Canadian patent 459,852. Filed April 18,

1946. Issued Sept. 20, 1949. 7 claims. Assigned to Paper Patents Company.

A filter element consists of a low-density, fluid-permeable, self-supporting filter wall which is adapted to be interposed in the path of flow of a fluid material which is to be filtered; the wall comprises a number of superimposed sheets of thin, dry-creped, cellulosic tissue, which are oriented at right angles to the normal direction of flow through the filter element; the individual fibers and sheets are bonded together by a synthetic-resin bonding material to form an integral, self-suppporting structure. The interstices between the fibers and the plies are free from resin; there are at least 240 bonded tissue sheets per inch of thickness of the filter wall in the direction of fluid flow. The filter wall has a specific gravity of 0.15-0.45. E.G.S.

### MACHINERY—SCREENS

HAUG, ANTON J. Pulp drainer. U. S. patent 2,483,200. Filed March 24, 1945. Issued Sept. 27, 1949. 13 claims. [Cl. 92-35; changed to 100-47]

A pulp drainer is designed for easy disassembly and repair; it is claimed that plugging of the screen and accumulation of stock at points where the draining action would be impeded is reduced. 5 drawings. E.G.S.

HAYES, MILLARD F. Mechanism for vibrating diaphragms of pulp screens. U. S. patent 2,481,999. Filed April 7, 1945. Issued Sept. 13, 1949. 1 claim. Assigned to The Sandy Hill Iron & Brass Works. [Cl. 74-26]

A mechanism is provided for vibrating diaphragms of pulp screens; its construction includes half-housings which form a chamber in which a crosshead reciprocates up and down; an arrangement for sealing the chamber permits movement of the crosshead and the diaphragm member. E.G.S.

### MOLDED PULP ARTICLES

ABBOTT, BOYD R. Rotary molding machine. U. S. patent 2,481,486. Filed April 10, 1943. Issued Sept. 13, 1949. 3 claims. Assigned to Armstrong Cork Company. [Cl. 92-61]

A molding machine is described for the production of insulating blocks of mineral wool, paper pulp, and a binder. The forming molds are arranged in a train and are conveyed in a closed circular path so that they are advanced intermittently to a number of operating stations along the path of travel. At these stations, various forming operations are performed in sequence. E.G.S.

### PAPER—COATED

ROEHM, WILLIAM A. Web coating apparatus and method. Canadian patent 459,538. Filed Feb. 28, 1947. Issued Sept. 6, 1949. 12 claims. Assigned to Virtu, Inc.

This is the same as U. S. patent 2,474,691; *cf.* B.I.P.C. 19:895-6. E.G.S.

### PAPER AS A TEXTILE MATERIAL

BROCKMAN, EDWARD J., and SCRUGGS, THOMAS M. Method of making paper yarn. U. S. patent 2,482,895. Filed March 29, 1946.

Issued Sept. 27, 1949. 6 claims. Assigned to Bemis Bro. Bag Company. [Cl. 57-165]

A method is given for making a wet-strength paper yarn. A paper strip is treated with water to soften its fibers, simultaneously impregnated and coated with either a thermosetting or thermoplastic resin, and spun or twisted into yarn while the fibers are still soft. A partially condensed urea-formaldehyde, melamine-formaldehyde, or polyvinyl acetate resin is suggested. E.G.S.

## PAPER SPECIALTIES

ANDERSON, EMIL. Receptacles with self-closing mouth. U. S. patent 2,483,169. Filed Oct. 4, 1945. Issued Sept. 27, 1949. 2 claims. Assigned to Electrolux Corporation. [Cl. 229-62]

A paper baglike dust-collecting receptacle for vacuum cleaners is provided with a self-closing mouth structure which automatically seals the receptacle against spilling of dirt when it is removed from the cleaner. E.G.S.

ANDERSON, HARLAN V., SR. Package. U. S. patent 2,481,380. Filed July 4, 1945. Issued Sept. 6, 1949. 3 claims. Assigned to Rapinwax Paper Company. [Cl. 229-14]

A frozen food package may be hermetically sealed and is formed of paperboard combined with a moistureproof, heat-sealable, metal-foil lining material. E.G.S.

FLETT, LAWRENCE H. Antifungus wrapper and method of pest control. U. S. patent 2,480,010. Filed March 27, 1947. Issued Aug. 23, 1949. 22 claims. Assigned to Allied Chemical & Dye Corporation. [Cl. 99-171]

An antifungus wrapper is made of moisture-resistant coated paper; the coating contains a small percentage (1-2%) of a lower dialkyl dichlorosuccinate as a high boiling antimycotic agent; the agent slowly vaporizes over a prolonged period. E.G.S.

GRANT, WILLIAM M. Wheeled carrier. U. S. patent 2,482,848. Filed Nov. 5, 1948. Issued Sept. 27, 1949. 4 claims. [Cl. 280-51]

A device is described for converting a large paper bag into a wheeled carrier for transporting groceries and other materials. E.G.S.

KONEN, ARNE E., and WARNER, SHERMAN K. Safety match packet. U. S. patent 2,482,189. Filed Dec. 31, 1946. Issued Sept. 20, 1949. 2 claims. [Cl. 206-29]

A book match packet is designed to prevent striking matches while the packet is open, with the heads of undetached matches exposed. E.G.S.

MODES, EDWARD E. Record envelope. U. S. patent 2,480,416. Filed Nov. 26, 1945. Issued Aug. 30, 1949. 2 claims. [Cl. 206-62]

A phonographic record envelope is constructed so that a record may be inserted by turning it through a slight angle in relation to the plane of the envelope and pushing into the envelope. E.G.S.

MOORE, GEORGE A. Bag for merchandising. U. S. patent

2,480,500. Filed March 16, 1946. Issued Aug. 30, 1949. 2 claims. Assigned to Reynolds Metals Company. [Cl. 229-62]

A bag is provided which may be hermetically sealed by the manufacturer to protect the merchandise from moisture, dirt, and insects; the bag can be formed of transparent or translucent sheet material, such as regenerated cellulose, rubber hydrochloride, waxed or oiled paper, or resinous materials. E.G.S.

MOORE, GEORGE A. Means for producing cigarette packages. U. S. patent 2,480,501. Filed Sept. 25, 1946. Issued Aug. 30, 1949. 1 claim. Assigned to Reynolds Metals Company. [Cl. 93-3]

In the production of yieldable cigarette packages of the type having a casing produced on an automatic packaging machine, a provision is made for forming a casing of flexible nonresilient sheet material coated with a thermoplastic adhesive material; the thermoplastic material is heated to adhesive consistency, the longitudinal seam is simultaneously pressed into sealing contact, and the end folds are settled and flattened by subjection to high frequency vibrations. E.G.S.

## PLASTICS

MARSHALL, HAMILTON L. J. Thermosetting synthetic molding composition and process for its manufacture. U. S. patent 2,481,136. Filed July 24, 1947. Issued Sept. 6, 1949. 6 claims. Assigned to Paterson Plastics Co. [Cl. 260-17.3]

A process for producing a thermosetting molding composition consists of contacting 100 lbs. of chemically neutral, oil-free, dried disintegrated wood with 25-43 lbs. of 37% formaldehyde and a small amount (2 oz./gal. of formaldehyde solution) of ethylene dichloride, drying the formaldehyde-ethylene dichloride-treated wood, treating the dried wood with 25-35 lbs. of urea crystals dissolved in water, and adding a filler. E.G.S.

## PLASTICS—PAPER-BASE

CHIDESTER, GARDNER H., BAIRD, PARKER K., MACKIN, GEORGE E., SIMMONDS, FORREST A., SEBORG, CLARENCE O., BRAY, MARK W., and MCGOVERN, JOHN N. Structural material of compressed resin impregnated paper sheets. U. S. patent 2,482,142. Filed Oct. 2, 1943. Issued Sept. 20, 1949. 6 claims. Dedicated to the free use of the People in the territory of the United States. [Cl. 154-45.9]

A structural material consists of compressed synthetic resin-bonded laminated paper sheets; the sheets are made from pulp having a freeness of 750-860 cc.; they have a porosity index of 3.2-75 seconds, an anisotropy of grain providing a ratio of at least 2:1 in tensile strength, a density of 0.60-0.80 g./cc., and a thickness of not more than four mils. The sheets contain a distribution of a solid, strengthening synthetic resin in their porous structure which bonds them together. The structural material has a tensile strength of at least 25,000 p.s.i., a modulus of elasticity in tension of over 2,000,000 p.s.i., and a density not less than 1.33. The synthetic resin may be a thermosetting phenol-formaldehyde, phenol-aldehyde, urea-aldehyde, or melamine-aldehyde resin. E.G.S.

GONDA, DESIRÉ. Glazed synthetic resin structure. U. S. patent 2,482,265. Filed Aug. 2, 1946. Issued Sept. 20, 1949. 1 claim. [Cl. 154-43]

A glazed synthetic resin structure consists of at least three perforated fibrous sheets (paper, cardboard, millboard, strawboard, cellulose pulp, fabric, or asbestos) impregnated with a thermosetting formaldehyde-condensation-product resin and rigidly bonded together by the resin; the sheets are superimposed on one another, with their perforations aligned. The perforation of one of the inner sheets is larger than those of the other sheets and provides means for rigidly retaining a window formed from a light-transmitting methyl methacrylate resin. E.G.S.

NAGEL, FRITZ J. Laminates embodying mixed phenol-arylamine-formaldehyde resinous products. U. S. patent 2,482,499. Filed May 21, 1946. Issued Sept. 20, 1949. 7 claims. Assigned to Westinghouse Electric Corporation. [Cl. 117-76; changed to 154-43]

A process for preparing resinous laminates involves the application to a fibrous sheet material of (A) the thermosetting partial reaction product derived by simultaneously reacting one mole of a phenol, 0.1-0.6 mole of a secondary diarylmonoamine, and sufficient formaldehyde to provide 0.8-1.5 moles for each mole of the phenol and diarylmonoamine, and (B) the thermosetting partial reaction product of one mole of phenol, 0.3-1.1 moles of a primary monoarylamine, and sufficient formaldehyde to provide 0.8-1.5 moles for each mole of phenol and 0.8-2.4 moles for each mole of the monoarylamine. The weight ratio of the reaction products ranges from 1 to 10 for (A) and 10 to 1 for (B). E.G.S.

NAGEL, FRITZ J. Phenol-amine-formaldehyde resin. U. S. patent 2,482,498. Filed May 10, 1946. Issued Sept. 20, 1949. 6 claims. Assigned to Westinghouse Electric Corporation. [Cl. 154-43]

A laminated structure is formed from a number of sheets of fibrous material and a resinous binder applied to the sheets; the resinous binder is the reaction product of 100 parts by weight of a phenol selected from the group consisting of hydroxybenzene, cresols, xylenols, and cresylic acid, 10-100 parts by weight of aniline, 3-110 parts by weight of diphenylamine, and an aldehyde selected from the class consisting of formaldehyde and its polymers; sufficient aldehyde is present to provide 0.8-1.5 moles for each mole of phenol and the diphenylamine and 0.8-2.5 moles per mole of aniline. The combination is reacted in the presence of an alkaline catalyst with refluxing and removal of water. Any primary monoarylamine may be substituted for aniline. E.G.S.

## PULPING PROCESSES

HERITAGE, CLARK C. Production of moulding fibre composition. Canadian patent 459,883. Filed Nov. 17, 1947. Issued Sept. 20, 1949. 10 claims. Assigned to Wood Conversion Company.

A method of treating wood includes mechanically defibering wood in about one minute at a temperature above 212° F., at which temperature the lignin in the wood is softened to render the wood plastic; this treatment is given in the presence of water vapor and a small quantity of reactive thermosetting synthetic resin; the resin reacts, in part at least, to block the fibers against subsequent normal absorption of reactive synthetic resin. The resin-treated fibers are then associated with reactive synthetic resin in the presence of water vapor to suspend the fibers; at the same time, a mass of free feltable resin-carrying fibers are provided. E.G.S.

## RAYON—VISCOSE PROCESS

BRACKETT, JOHN. Process for disintegration of moist fibrous alkali cellulose masses. U. S. patent 2,480,998. Filed Sept. 7, 1944. Issued Sept. 6, 1949. 6 claims. Assigned to American Viscose Corporation. [Cl. 241-27; changed to 241-19]

In a process for preparing moist aggregates of alkali cellulose for conversion to cellulose derivatives, the aggregates are introduced into the suction stream of a fan operating at a linear peripheral speed of at least 10,000 ft./min. in a closed channel having inlet and discharge openings; the aggregates are carried in the stream through the fan so that the disintegrating masses are subjected to the successive action of impact and sliding friction on the surfaces within the fan system and are simultaneously subjected to the turbulent action of the gas currents developed within the fan system. The introduction of significant amounts of heat is avoided, so that the channel is maintained near room temperature. Sufficient evaporation occurs from the surfaces of the disintegrating masses to prevent adhesion of the masses to the system. The alkali cellulose is converted to a light, fluffy condition capable of rapid reaction to produce derivatives of uniform quality. The fibers are settled from the fluid stream discharged from the fan, and a substantial portion of the fluid stream is returned to the suction side of the fan to minimize the amount of carbon dioxide carried into the suction stream of the fan. E.G.S.

## ROOFING FELTS

MACK, CHARLES. Building materials of high elasticity. U. S. patent 2,481,523. Filed Oct. 9, 1946. Issued Sept. 13, 1949. 1 claim. Assigned to Standard Oil Development Company. [Cl. 106-216; changed to 106-202]

A flexible, elastic building composition consists essentially of a fibrous material (wood pulp, paper pulp, or cotton) bonded with a blend having a softening point of at least 160° F. and composed of aluminum naphthenate and asphalt. E.G.S.

VAN DEN BERGE, JACOB. Bitumen coated surface and method of making. U. S. patent 2,481,370. Filed March 25, 1946. Issued Sept. 6, 1949. 4 claims. Assigned to Shell Development Company. [Cl. 117-92]

A method is given of coating paper, felt, fabric, metal, concrete, or wood with at least two asphaltic bituminous materials of different penetration indexes; a bitumen containing 10% by weight of a bituminous material is applied as the substance having the lower penetration index; asphaltenes constitute 12% by weight of the bituminous material and have a carbon-to-hydrogen mole ratio of at least 0.95. E.G.S.

## SHIPPING CONTAINERS

BELSINGER, JACK R. Sealable carton with multiple bottom. U. S. patent 2,483,174. Filed May 6, 1947. Issued Sept. 27, 1949. 7 claims. Assigned to Belsinger, Inc. [Cl. 229-23]

A fiberboard or corrugated-board container is provided for fruit, bottled goods, and other articles; the carton has a double bottom and a body portion containing a handle structure, which furnishes reinforcement at the upper

edge of the body; a hinged cover overlaps the reinforcement and fits snugly with the body for easy sealing. E.G.S.

MCKENZIE, DENNIS I. Shipping container. U. S. patent 2,481,855. Filed June 8, 1946. Issued Sept. 13, 1949. 2 claims. Assigned to The Moraine Box Company. [Cl. 229-23]

A fiberboard shipping container or carton carries a wall reinforcement which supports the weight of the article to be placed in the container. E.G.S.

NEWSOM, KITCHENER K. Shipping box. Canadian patent 459,601. Filed March 21, 1946. Issued Sept. 13, 1949. 6 claims.

This is the same as U. S. patent 2,475,107; *cf.* B.I.P.C. 19: 899. E.G.S.

POLGLASE, THOMAS R., and HOEBEKE, HENRY J. Shipping package for heavy spools. U. S. patent 2,482,869. Filed June 16, 1948. Issued Sept. 27, 1949. 1 claim. Assigned to Anaconda Wire and Cable Company. [Cl. 206-59]

A shipping package for heavy spools of magnet wire consists of two semicylinders, the inside diameters of which are about equal to the diameters of the spool flanges, so that when the semicylinders are assembled, the spools are held in place. The semicylinders may be made of vulcanized or plastic-impregnated fiber, but preferably of very heavy paperboard (0.25 inch thick) for spools up to six inches in diameter. E.G.S.

POTTS, ROY C. Handhold and card pocket. U. S. patent 2,481,871. Filed April 26, 1944. Issued Sept. 13, 1949. 3 claims. [Cl. 229-52]

A handhold pocket structure is provided for two-ply wall boxes such as standard egg crates. A tonguelike flap in the end of the carton may be pushed in to permit insertion of the handler's fingers, thus providing a firm grip adapted to a heavy load. E.G.S.

## SULFITE PROCESS

KYRKLUND, GUNNAR. Method in sulphite pulping for obtaining concentrated waste liquor. Canadian patent 459,308. Filed Nov. 12, 1947. Issued Aug. 30, 1949. 6 claims. Assigned to Kymin Osakeyhtiö-Kymmene Aktiebolag.

A method for concentration of the organic material in the waste liquor in sulfite pulping includes a two-stage process consisting of a precook and a final cook; the sulfite waste liquor is withdrawn from the final cook, admixed with a base and fortified with sulfur dioxide as required, and used as the cooking acid in the precook. The precook is terminated when most of the cellulosic material has dissolved prior to full ripeness of the pulp; a portion of the waste liquor is withdrawn from the precook for subsequent recovery of its organic content; the final cook is made after the introduction of a requisite amount of new cooking acid. E.G.S.

## SULFITE WASTE LIQUOR

WÅHLIN, BENGT G. Method of producing a suspension of fibrous material. U. S. patent 2,481,959. Filed Dec. 21, 1945. Issued Sept.

13, 1949. 1 claim. Assigned to Svenska Cellulosa Aktiebolaget. [Cl. 261-36]

A method is given for preparing a foamy mass of sulfite waste liquor and a fibrous material suspended in water. The fibrous suspension containing the waste liquor is passed through a conduit provided with a foaming section having air inlets and means for imparting a rotating or whirling motion to the suspension; at the same time, air is sucked in through the inlets, and the suspension leaves the conduit as a foamy mass. The material is suitable for the manufacture of highly porous fiberboards or similar products.
E.G.S.

## TALL OIL

KALMAN, NICHOLAS L. Synthetic rubber compositions. U. S. patent 2,480,478. Filed Sept. 22, 1943. Issued Aug. 30, 1949. 9 claims. Assigned to Pierce Laboratory, Inc. [Cl. 260-23.7]

A synthetic rubber composition contains a butadiene-styrene copolymer, a semireinforcing furnace black, and sulfurized tall oil of sticky viscous consistency; the composition, when vulcanized, has a cold tear resistance of at least 140 lbs., a hot tear resistance at 70° C. of at least 75 lbs., and a modulus of elasticity not exceeding 700 lbs. at 300% elongation. E.G.S.

## TEXTILE INDUSTRY AND FABRICS—FIREPROOFING

FORD, FLORENCE M., and HALL, WILLIAM P. Flameproofing of fibrous material. U. S. patent 2,482,755. Filed May 29, 1945. Issued Sept. 27, 1949. 12 claims. Assigned to Joseph Bancroft & Sons Co. [Cl. 8-116.2]

A flameproofing composition is prepared by mixing 100 parts of urea with 50 parts of orthophosphoric acid (75%) and heating rapidly to 375° F.; the resulting mixture is cooled and 75 parts of water are added, followed by 7 parts of ammonium hydroxide (28%) and 10 parts of formaldehyde (37%). 50 examples. E.G.S.

FORD, FLORENCE M., and HALL, WILLIAM P. Flameproofing of fibrous materials. U. S. patent 2,482,756. Filed June 10, 1944. Issued Sept. 27, 1949. 4 claims. Assigned to Joseph Bancroft & Sons Co. [Cl. 8-116.3]

A flameproofing composition is prepared by mixing 100 parts of urea with 50 parts of orthophosphoric acid (75%) and heating rapidly to 375° F.; the resulting mixture is cooled and 75 parts of water are added, followed by 7 parts of ammonium hydroxide (28%) and 10 parts of formaldehyde (37%). 4 examples. E.G.S.

TRUHLAR, JOHN, and PANTSIOS, ATHAN A. Fireproofing composition. U. S. patent 2,480,790. Filed July 28, 1945. Issued Aug. 30, 1949. 1 claim. Assigned to Rudolf F. Hlavaty. [Cl. 106-15]

A fireproofing composition consists essentially of a mixture of chlorinated wax and chlorinated naphthalene with a fireproofing ingredient which inhibits the corrosive action of the chlorinated substances; the fireproofing ingredient includes an organic phosphite chosen from the group consisting of di- and trimethyl, -ethyl, -isopropyl, -propyl, -butyl, -amyl, -hexyl, -cyclohexyl, -phenyl, and -cresyl phosphites; 10 to 20 parts by weight of the ingredient are added for each 100 parts of the mixture of chlorinated substances.
E.G.S.

## TEXTILE INDUSTRY AND FABRICS—TESTING

DEWAARD, RUSSELL D., and STOCK, CHARLES R. Method of and device for testing crease resistance. U. S. patent 2,482,470. Filed Oct. 11, 1946. Issued Sept. 20, 1949. 7 claims. Assigned to American Cyanamid Company. [Cl. 73-100]

A method for determining the crease resistance of a sheet involves folding a sheet upon itself, applying a predetermined pressure to the fold for a predetermined length of time, removing the pressure, hanging the creased sheet over a support, and measuring the angle between the legs of the folded sheet. The method and apparatus are specified for textile testing, but would also be applicable to paper testing. E.G.S.

## TRANSPARENT CONTAINERS

FOGEL, SAMUEL. Transparent display container with slide. U. S. patent 2,481,302. Filed June 6, 1946. Issued Sept. 6, 1949. 3 claims. [Cl. 206-45.34]

This is the same as Canadian patent 452,926; *cf.* B.I.P.C. 19: 376. E.G.S.

## ULTRA-VIOLET RAYS

COE, MAYNE R. Packaged meat and like products and process thereof. U. S. patent 2,461,522. Filed Sept. 19, 1946. Issued Feb. 15, 1949. 13 claims. Assigned to Rile-Coe Filter Process, Inc. [Cl. 99-174]

A method is given for packaging meat, fish, eggs, and similar commodities, and a packaging material is provided which acts as a color screen to absorb all ultraviolet, violet, and blue light (i.e., below 4900 A.), as well as light in the region of 6300-6700 A. It is claimed that such shielding enables foods containing vitamins, enzymes, and porphyrins to retain their natural characteristics and potency. The color screen may comprise materials normally translucent or transparent to visible light, such as glass, glassine, synthetic plastics, gelatin, casein, synthetic resins, and nonfibrous cellulosic materials, as well as laminated glass, paper, and textiles. E.G.S.

## YEAST

HATCH, RAYMOND S., and HAMMOND, RICHARD N. Method for growing aerobic organisms. U. S. patent 2,482,908. Filed May 16, 1945. Issued Sept. 27, 1949. 6 claims. Assigned to Weyerhaeuser Timber Company. [Cl. 195-107]

A method is given for the propagation of yeast, molds, fungi, and other organisms which require large amounts of atmospheric oxygen for their development when grown in liquid substrates. Air is beaten into a central portion of a liquid substrate containing the inoculum of the organism and its nutrient at the air-substrate interface to obtain intimate contact between the oxygen of the air and the substrate. The substrate is agitated until a foam is produced, the foam and entrained liquid are passed up through an annular space surrounding the main body of liquid, and the residual foam is beaten into the substrate with fresh air. E.G.S.

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